50DJ,DK,DW,DY024-030 Single-Package Cooling Units

Installation, Start-Up and Service Instructions

CONTENTS

Book 1 | Tab 1b | PC 111 | Catalog No. 565-027 | Printed in U.S.A. | Form 50D-2SI | Pg 1 | 4-95 | Replaces: 50DJ,DK-13SI

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

⚠ CAUTION

On 50DK units the evaporator fan can start at any time after the initialization period when the timeclock places the unit in the occupied mode.

Always turn power to unit off before performing any service or maintenance.

INSTALLATION

This book contains instructions for 50DJ,DW constant volume (CV) units and 50DK,DY variable air volume (VAV) units.

Rigging and Unit Placement — Inspect unit for transportation damage. File claim with transportation agency. Do not drop unit; keep upright. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as reference. See Fig. 1 for additional information. Unit weight is shown in Tables 1A and 1B. **These units are not designed for handling by forklift trucks.**

Roof Curb — Assemble and install as described in instructions shipped with this accessory. Accessory roof curb and information required to field fabricate a roof curb is shown in Fig. 2A and 2B. Install insulation cant strips, roofing, and counter flashing as required. For unit drains to function properly, curb must be level or within tolerances shown in Fig. 2A and 2B.

Roof Mount — Check building codes for weight distribution requirements. Unit weight is shown in Tables 1A and 1B.

Slab Mount — Provide a level concrete slab that extends beyond unit cabinet at least 6 inches. Make a slab 8 in. thick with 4 in. above grade. (For condensate drain to function properly, slab must be at least 4 in. above grade.) Use gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTICE TO RIGGERS

UNIT 50	WEIGHT		A		B		C		ECONOMIZER (Without Hood)	
	lb	kg	in.	mm	in.	mm	in.	mm	lb	kg
DJ,DK024	2440	1107	66.14	1680	49	1244.6	44	1117.6	130	59.1
DW,DY024	2650	1202	85.91	2182	61	1549.4	43	1092.2	130	59.1
DJ,DK028	2900	1315	77.01	1956	53	1346.2	44	1117.6	140	63.6
DW,DY028	3100	1406	97.24	2470	66	1676.4	43	1092.2	140	63.6
DJ,DK030	2930	1329	77.01	1956	53	1346.2	44	1117.6	140	63.6
DW,DY030	3140	1424	97.24	2470	66	1676.4	43	1092.2	140	63.6

NOTES:
1. Rig with 4 cables and spread with two 95 in. (2413 mm) and 2 “A” long suitable spreader bars.
2. Center of gravity and unit weight include economizer.

⚠ CAUTION

1. All panels must be in place with rigging.
2. Unit is not designed for handling by forklift truck.

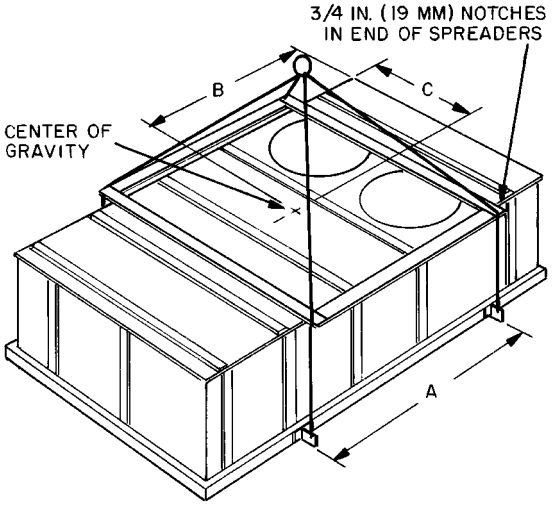


Fig. 1 — Rigging Label

Table 1A — Physical Data, Constant Volume Units

UNIT 50	DJ024	DW024	DJ028	DW028	DJ030	DW030
OPERATING WEIGHT (lb)*	2440	2650	2900	3100	2930	3140
COMPRESSORS (2 each unit)	Semi-Hermetic, 06D Type, 1750 Rpm					
Capacity Steps (%)						
Standard	62, 100		60, 100		55, 100	
Accessory	21, 42, 62, 80, 100		20, 40, 60, 80, 100		18, 37, 55, 65, 83, 100	
REFRIGERANT	R-22, Controlled by Thermostatic Expansion Valve					
Operating Charge (lb), Circuit 1/Circuit 2	23.1/18.1		22.6/16.3		22.3/18.3	
CONDENSER COILS	3-Row, ⅜-in. Tube Diameter					
Face Area (sq ft)	24.75					
Fins Per in.						
Al	17.0		19.0		19.0	
Cu	15.7		17.5		17.5	
EVAPORATOR COILS	4-Row, ½-in. Tube Diameter					
Face Area (sq ft)	20.1		23.4		23.4	
Fins Per in.	15		15		15	
CONDENSER FANS (2 each unit)	Propeller Type, 30-in. Diameter, 1140 Rpm					
Nominal Cfm	10,000		13,000		15,000	
Nominal Hp	¾ (208/230, 460 v); 1 (575 v)		1		1	
EVAPORATOR FANS (1 each unit)†	Centrifugal Type, 18 x 15-in., Service Factor 1.15					
Nominal Cfm	8,000		10,000		10,800	
Maximum Allowable Cfm	10,000		12,500		12,500	
Maximum Allowable Rpm	1,200		1,200		1,200	
Standard Motor and Drive	1.438-in. Fan Pulley Bore					
Motor Hp	5		7½		10	
Full Load Efficiency (%)						
Standard	84.3		84.8		87.4	
High	86.5		88.5		89.5	
Motor Frame Size	184T		213T		215T	
Fan Pulley Pitch Diameter (in.)	10.6		8.0		8.0	
Motor Pulley Pitch Diameter (in.)	4.75		4.12		4.50	
Resulting Fan Rpm	780		900		980	
Optional Motor and Drive	1.438-in. Fan Pulley Bore					
Motor Hp	7½		10		15	
Full Load Efficiency (%)						
Standard	84.8		87.4		85.7	
High	88.5		89.5		90.0	
Motor Frame Size	213T		215T		254T	
Fan Pulley Pitch Diameter (in.)	8.0		8.0		8.0	
Motor Pulley Pitch Diameter (in.)	4.12		4.50		5.00	
Resulting Fan Rpm	900		980		1090	
OPTIONAL POWER EXHAUST**	Propeller Type, 1140 Rpm					
Motors...Hp	1...1	NA	1...1	NA	1...1	NA
Fans...Diam (in.)	1...24		1...30		1...30	
FILTERS¶ (Quantity...L x W x D)	Throwaway					
20% Standard Efficiency	2...18 x 24 x 2 4...24 x 24 x 2		2...18 x 24 x 2 6...20 x 24 x 2		2...18 x 24 x 2 6...20 x 24 x 2	

LEGEND

Al — Aluminum
Cu — Copper

*Weights do not include economizer. See Fig. 1 for economizer weights.
†Standard fan motor is supplied with standard fan drive and belts. Optional fan motor is supplied with optional fan drive, pulleys, and belts. Other combinations are field supplied.
**Optional unit-mounted power exhaust not available (NA) on 50DW units. Accessory constant volume power exhaust may be duct mounted on 50DW installation.

Table 1B — Physical Data, Variable Volume Units

UNIT 50	DK024	DY024	DK028	DY028	DK030	DY030
OPERATING WEIGHT (lb)*	2440	2650	2900	3100	2930	3140
COMPRESSORS (2 each unit)	Semi-Hermetic, 06D Type, 1750 Rpm					
Capacity Steps (%)	21, 42, 62, 80, 100		20, 40, 60, 80, 100		18, 37, 55, 65, 83, 100	
REFRIGERANT	R-22, Controlled by Thermostatic Expansion Valve					
Operating Charge (lb), Circuit 1/Circuit 2	25.2/18.1		24.6/16.3		24.3/18.3	
CONDENSER COILS	3-Row, ⅜-in. Tube Diameter					
Face Area (sq ft)	24.75					
Fins Per in.						
Al	17.0		19.0		19.0	
Cu	15.7		17.5		17.5	
EVAPORATOR COILS	4-Row, ½-in. Tube Diameter					
Face Area (sq ft)	20.1		23.4		23.4	
Fins Per in.	15		15		15	
CONDENSER FANS (2 each unit)	Propeller Type, 30-in. Diameter, 1140 Rpm					
Nominal Cfm	10,000		13,000		15,000	
Nominal Hp	¾ (208/230, 460 v); 1 (575 v)		1		1	
EVAPORATOR FANS (1 each unit)†	Centrifugal Type, 18 x 15-in., Service Factor 1.15					
Nominal Cfm	8,000		10,000		10,800	
Maximum Allowable Cfm	10,000		12,500		12,500	
Maximum Allowable Rpm	1,200		1,200		1,200	
Standard Motor and Drive	1.438-in. Fan Pulley Bore					
Motor Hp	5		7½		10	
Full Load Efficiency (%)						
Standard	84.3		84.8		87.4	
High	86.5		88.5		89.5	
Motor Frame Size	184T		213T		215T	
Fan Pulley Pitch Diameter (in.)	10.6		8.0		8.0	
Motor Pulley Pitch Diameter (in.)	4.75		4.12		4.50	
Resulting Fan Rpm	780		900		980	
Belts (No Inlet Guide Vanes)						
Quantity	2	2	2	2	3	3
Length (in.)	56	85	47	85	47	85
Belts (Inlet Guide Vanes)						
Quantity	2	2	2	2	2	2
Length (in.)	53	95	45	90	53	100
Optional Motor and Drive	1.438-in. Fan Pulley Bore					
Motor Hp	7½		10		15	
Full Load Efficiency (%)						
Standard	84.8		87.4		85.7	
High	88.5		89.5		90.0	
Motor Frame Size	213T		215T		254T	
Fan Pulley Pitch Diameter (in.)	8.0		8.0		8.0	
Motor Pulley Pitch Diameter (in.)	4.12		4.50		5.00	
Resulting Fan Rpm	900		980		1090	
Belts (No Inlet Guide Vanes)						
Quantity	2	2	3	3	3	3
Length (in.)	47	80	47	85	50	85
Belts (Inlet Guide Vanes)						
Quantity	2	2	2	2	3	3
Length (in.)	45	90	53	100	45	95
OPTIONAL POWER EXHAUST**	Propeller Type, 1140 Rpm					
Motors...Hp	1...1	NA	1...1	NA	1...1	NA
Fans...Diam (in.)	1...24		1...30		1...30	
FILTERS¶ (Quantity...L x W x D)	Throwaway					
20% Standard Efficiency	2...18 x 24 x 2 4...24 x 24 x 2		2...18 x 24 x 2 6...20 x 24 x 2		2...18 x 24 x 2 6...20 x 24 x 2	

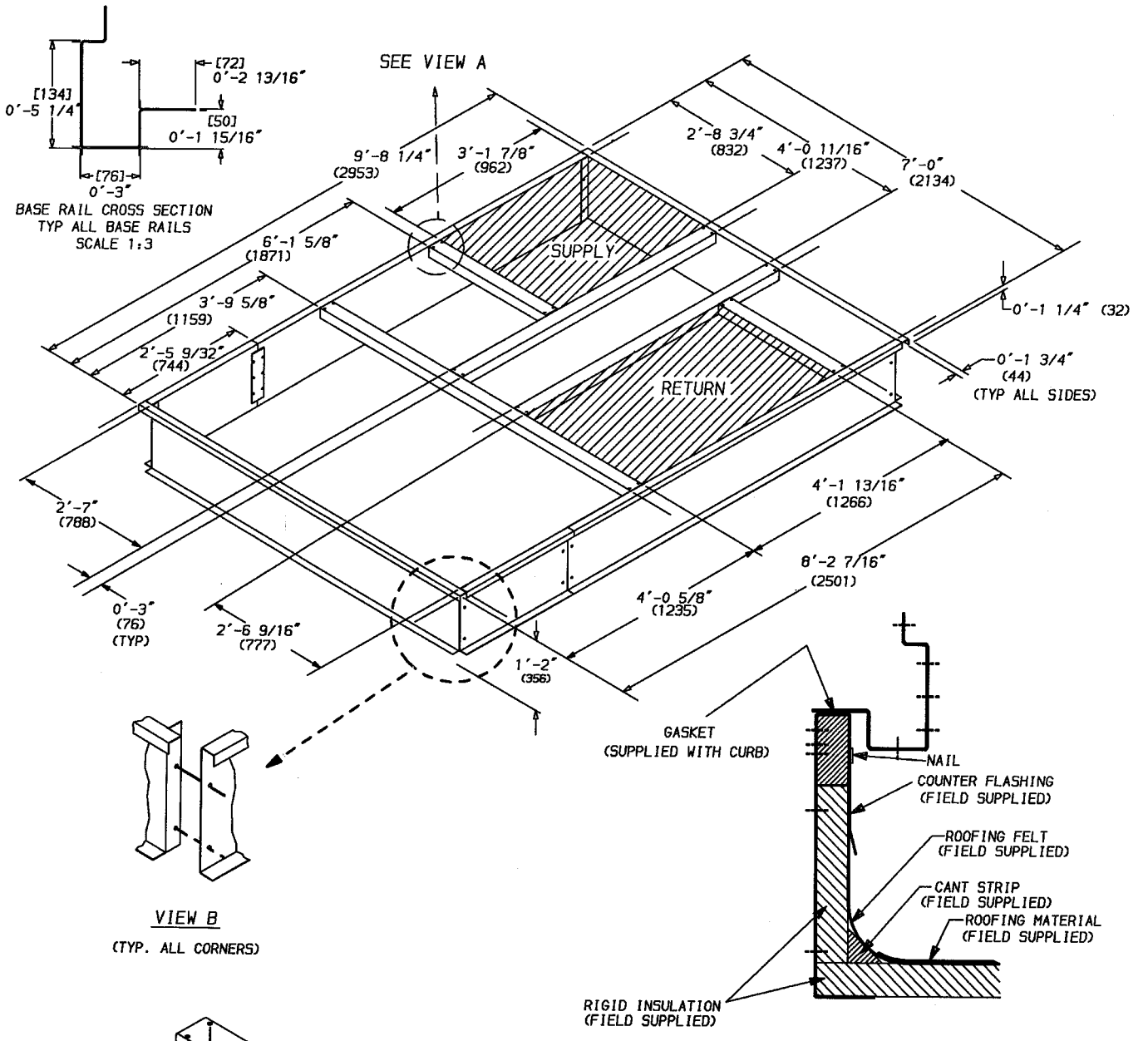
LEGEND

Al — Aluminum
Cu — Copper

*Weights do not include economizer. See Fig. 1 for economizer weights.

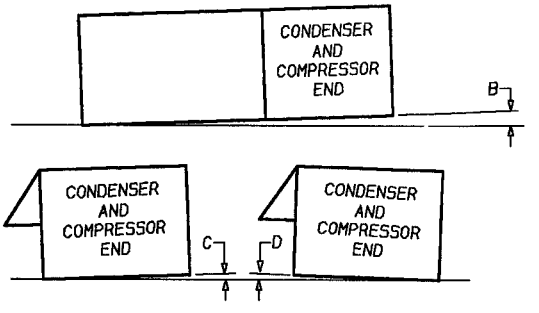
†Standard fan motor is supplied with standard fan drive and belts. Optional fan motor is supplied with optional fan drive, pulleys, and belts. Other combinations are field supplied.

**Optional unit-mounted power exhaust not available (NA) on 50DYunits. Accessory modulating power exhaust may be duct mounted on 50DY installations.



UNIT LEVELING TOLERANCES

NOTE: To prevent the hazard of stagnant water build-up in the drain pan of the indoor-air section, unit can only be pitched as shown.

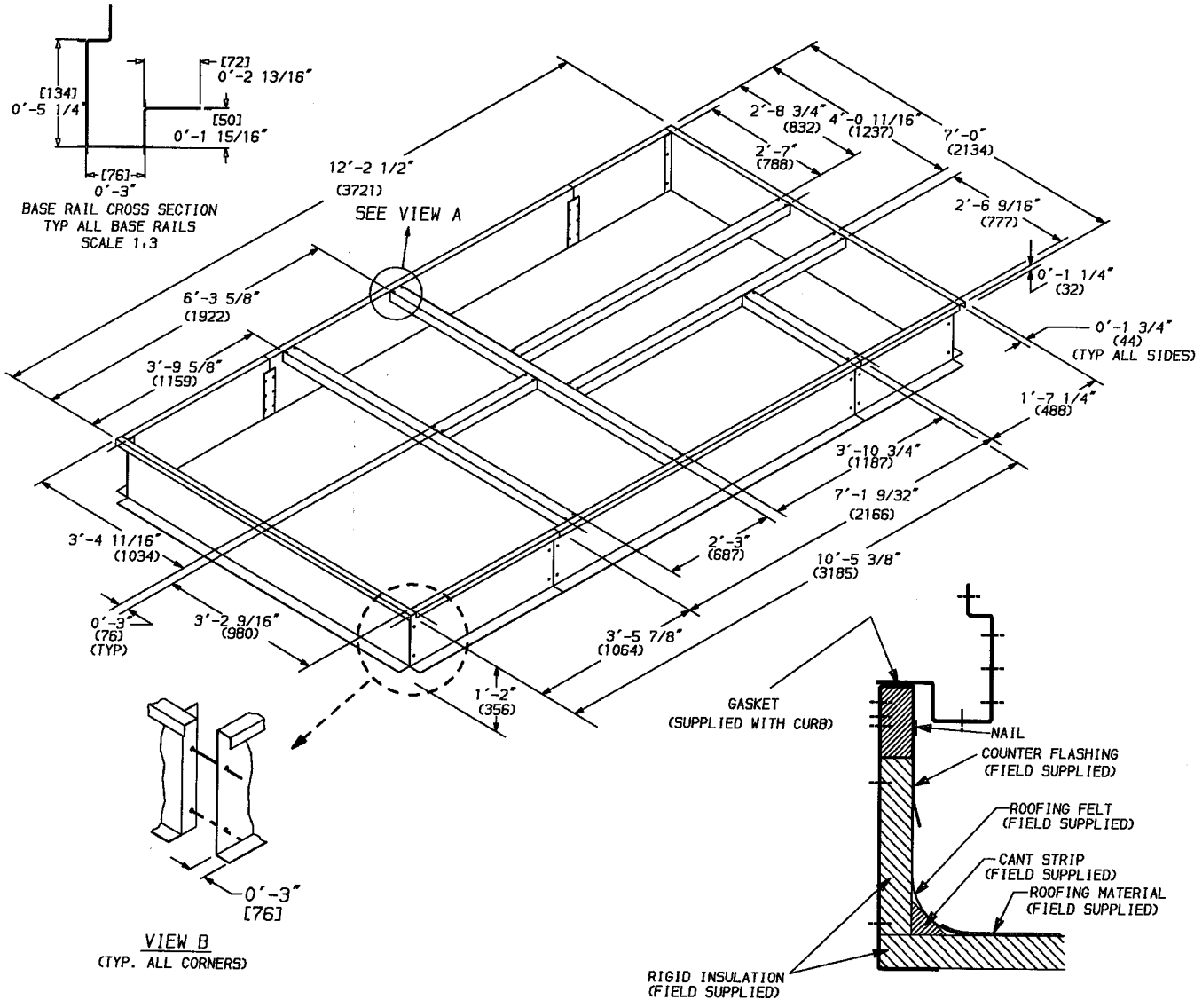


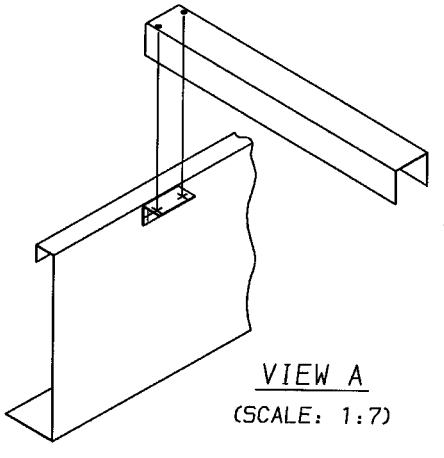
NOTES:
1. Roof curb accessory 50DJ900391 is shipped unassembled.
2. Dimensions in ( ) are millimeters.
3. Roof curb: 18 gage steel.
4. The 028 and 030 units overhang the roof curbs on supply air/return air end.

DIMENSIONS (degrees and inches)

UNIT	B		C		D	
	Deg	in.	Deg	in.	Deg	in.
50DJ,DK	1.00	3.25	.50	.75	.50	.75

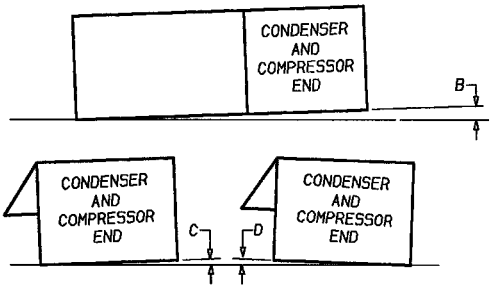
Fig. 2A — Accessory Roof Curb Dimensions, 50DJ,DK





UNIT LEVELING TOLERANCES

NOTE: To prevent the hazard of stagnant water build-up in the drain pan of the indoor-air section, unit can only be pitched as shown.



NOTES:
1. Roof curb accessory 50DJ900401 is shipped unassembled.
2. Dimensions in ( ) are millimeters.
3. Roof curb: 18 gage steel.
4. The 028 and 030 units overhang the roof curbs on the return air end.

DIMENSIONS (degrees and inches)

UNIT	B		C		D	
	Deg	in.	Deg	in.	Deg	in.
50DW,DY	1.38	4.00	.50	.75	.50	.75

Fig. 2B — Accessory Roof Curb Dimensions, 50DW,DY

Alternate Unit Support Methods — Where the preferred curb or slab mount cannot be used, support unit with sleepers on perimeter, using curb support area. However, if sleepers cannot be used, support long sides of unit (see Fig. 3A and 3B) with three 4-in. x 4-in. pads equally spaced. Unit may sag if supported by corners only.

Vertical discharge ducts are designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended that the ducts be supported by cross braces as shown for accessory roof curb (Fig. 2A and 2B).

Positioning — Provide clearance around and above unit for airflow, safety, and service access. Allow 12 ft above the unit, and at least 4 ft on all sides for rated performance and code compliance. If unit has economizer, allow 6-ft clearance on that side. For preferred service access, allow 6-ft clearance on all sides.

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Field-Fabricated Ductwork — Secure all ducts to building structure using flexible duct connectors between roof curb and ducts as required. Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier. Outlet grilles must not lie directly below unit discharge.

MODELS 50DJ,DK VERTICAL SUPPLY/RETURN (Fig. 3A) — On these units, attach field-fabricated ductwork to roof curb. The return air duct connection (inside dimensions) is 49.81-in. long x 30.59-in. wide; the supply air duct connection (inside dimensions) is 37.87-in. long x 31.02-in. wide. Connect ductwork to 18-gage roof curb material. (See Installation Instructions shipped with accessory roof curb.)

MODELS 50DW,DY HORIZONTAL SUPPLY/RETURN (Fig. 3B) — On these units, attach field-fabricated ductwork to factory-supplied duct flanges mounted on the side of the unit. Duct flange height is approximately 1 in.; flange is 18-gage sheet metal. The supply and return duct openings (inside dimensions) for 024 units are 26.85-in. wide x 42.03-in. high. The supply duct opening for 028 and 030 units is 26.85-in. wide x 42.03-in. high, and the return duct opening for 028 and 030 units is 31.89-in. wide x 42.03-in. high.

Condensate Drain — Two condensate drain holes are located in the unit base rail to allow greater flexibility during installation. One hole must be selected for a condensate drain (see Fig. 4), and the other hole must be sealed.

The drain assembly consists of a 10-gage steel plate with 1¼-in. half coupling welded to it, and is shipped in the unit fan section. Also included is a 16-gage metal seal plate to cover the drain hole not selected for use. Open the access door marked FILTER SECTION and find the drain assembly, 16-gage metal seal plate and 8 screws necessary for mounting taped to the unit basepan.

After the unit has been set in place on the roof:

1. Select the appropriate drain location. See Fig. 4.
2. Remove the drain assembly and attach it to the bottom of the unit base rail at the preferred drain location using 4 of the screws provided. See Fig. 5.

   NOTE: Use a trap at least 4-in. deep.
3. Cover the remaining drain hole with the 16-gage metal seal plate and attach the plate using the other 4 screws provided. See Fig. 6.
4. Apply a bead of RTV or similar sealant around the drain assembly and 16-gage metal seal plate where they attach to the rail. See Fig. 7.

If drain line is run to a roof drain, pitch line away from unit at one in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

On slab mount applications, and when mounted on sleepers, seal hole in bottom of base rail and attach drain assembly as low as possible to side of base rail.

NOTE: Drain hole must be drilled in the rail. There is no factory-supplied drain hole in the side of the base rail.

Outdoor Air Inlet Adjustments

MANUAL OUTDOOR-AIR DAMPER — All units except those equipped with a factory-installed economizer have a manual outdoor air damper to provide ventilation air. This damper can be preset to admit up to 25% outdoor air into the return-air compartment. See Fig. 8. To adjust, loosen the blade limiter screws as shown and move the damper to the desired position. Then retighten the blade limiter screws to secure the damper. (To make this adjustment, it is necessary to climb into the return air compartment. Access is through the door marked FILTER SECTION.)

ECONOMIZER SETTINGS

Enthalpy Control — This control is located on the partition separating the outdoor air section from the return air section. See Fig. 9. For maximum benefit of outdoor air, set enthalpy control to the "A" setting. See Fig. 10 and 11.

Mixed Air Thermistor (Constant Volume Units Only) — This control (MAT) set point adjustment is on the top of the economizer motor. This motor is located in the return-air section, and is accessed by opening the access door marked FILTER SECTION. See Fig. 10. Set MAT set point adjustment dial to the desired setting. The factory setting is 55 F ± 5 F; the range is 40 to 90 F. The MAT is located on the filter rack.

Minimum Position Set Point

Constant Volume Units — The position setting adjustment is located on the cover of the economizer motor. See Fig. 10. Adjust by setting the fan switch at ON position (continuous fan operation), and setting the system selector switch to OFF position. Then turn adjustment screw slowly until the dampers assume the desired vent position. Do not manually operate the damper motor; damage to the motor may result.

Variable Air Volume Units — Minimum economizer position is set using minimum economizer position potentiometer (P5) located on accessory board in unit control box. See Switch and Potentiometer Settings, VAV units only on page 37.

LEGEND

CONN — Connection
DIM — Dimension

NOTES:
1. Dimensions in [ ] are in millimeters.
2. Center of gravity.
3. Allow 12′-0″ (3658) at top and 6′-0″ (1829) on sides for service and operational clearance.
4. On multiunit applications allow 12′-0″ (3658) between adjacent condensers and economizers.
5. For smaller service and operational clearances, contact your local representative.
6. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on the accessory roof curb.
7. Always line up condenser end of unit tight against the roof curb.
8. Units with power exhaust and/or electric heat require a 90° elbow in return-air duct.

UNIT 50DJ,DK	WEIGHT*		A		B		C		D		E		F	
	Lb	Kg	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.
024	2440	1107	1244.6	4-1	1680.0	5-6⅛	3141.0	10-3¹¹⁄₁₆	525.5	1-8¹¹⁄₁₆	807.0	2-7¾	2048.0	6- 8⅝
028	2900	1315	1346.2	4-5	1956.0	6-5	3397.0	11-1¾	382.5	1-3¹⁄₁₆	935.0	3-0¹³⁄₁₆	2131.0	6-11⅞
030	2930	1329												

*Weights include economizer but not rainhood.

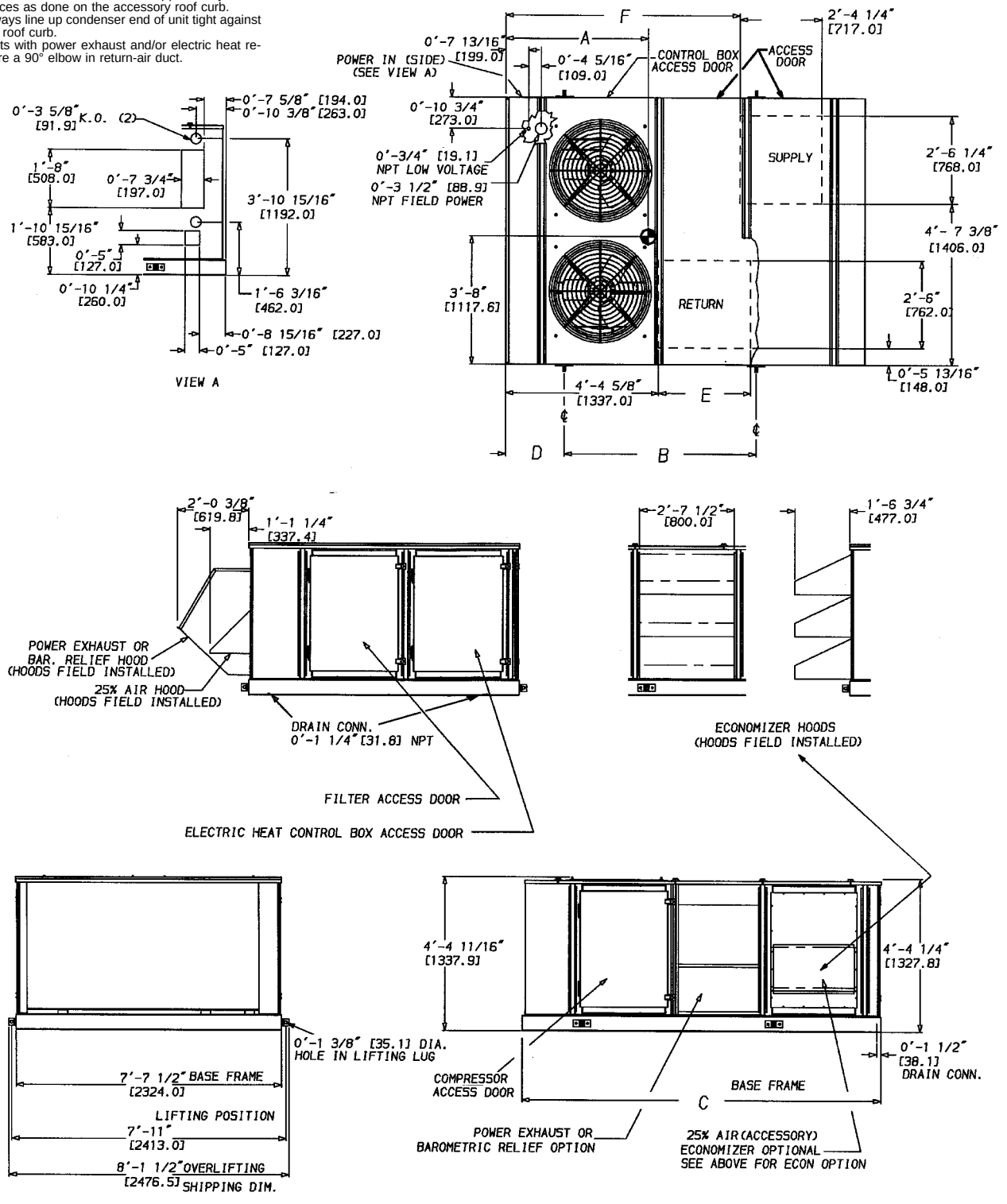


Fig. 3A — Base Unit Dimensions, 50DJ,DK

LEGEND

CONN — Connection
DIM — Dimension

NOTES:
1. Dimensions in [ ] are in millimeters.
2. Center of gravity.
3. Allow 12′-0″ (3658) at top and 6′-0″ (1829) on sides for service and operational clearance.
4. On multiunit applications allow 12′-0″ (3658) between adjacent condensers and economizers.
5. For smaller service and operational clearances, contact your local representative.
6. Always line up condenser end of unit tight against the roof curb.
7. When unit is slab mounted, locate the condensate drain as low as possible on vertical face of base rail at the same location as the standard condensate drain using factory supplied fitting. Plug factory drilled condensate hole.

UNIT 50DW,DY	WEIGHT*		A		B		C		D		E	
	Lb	Kg	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.
024	2650	1202	1549.4	5-1	2182.0	7-1⅞	682.0	2-2⅞	3909.0	12-9⅞	533.5	1-9
028	3100	1406	1676.4	5-6	2470.0	8-1¼	810.0	2-7⅞	4165.0	13-8	379.5	1-2 15/16
030	3140	1424										

*Weight includes economizer but not rainhood.

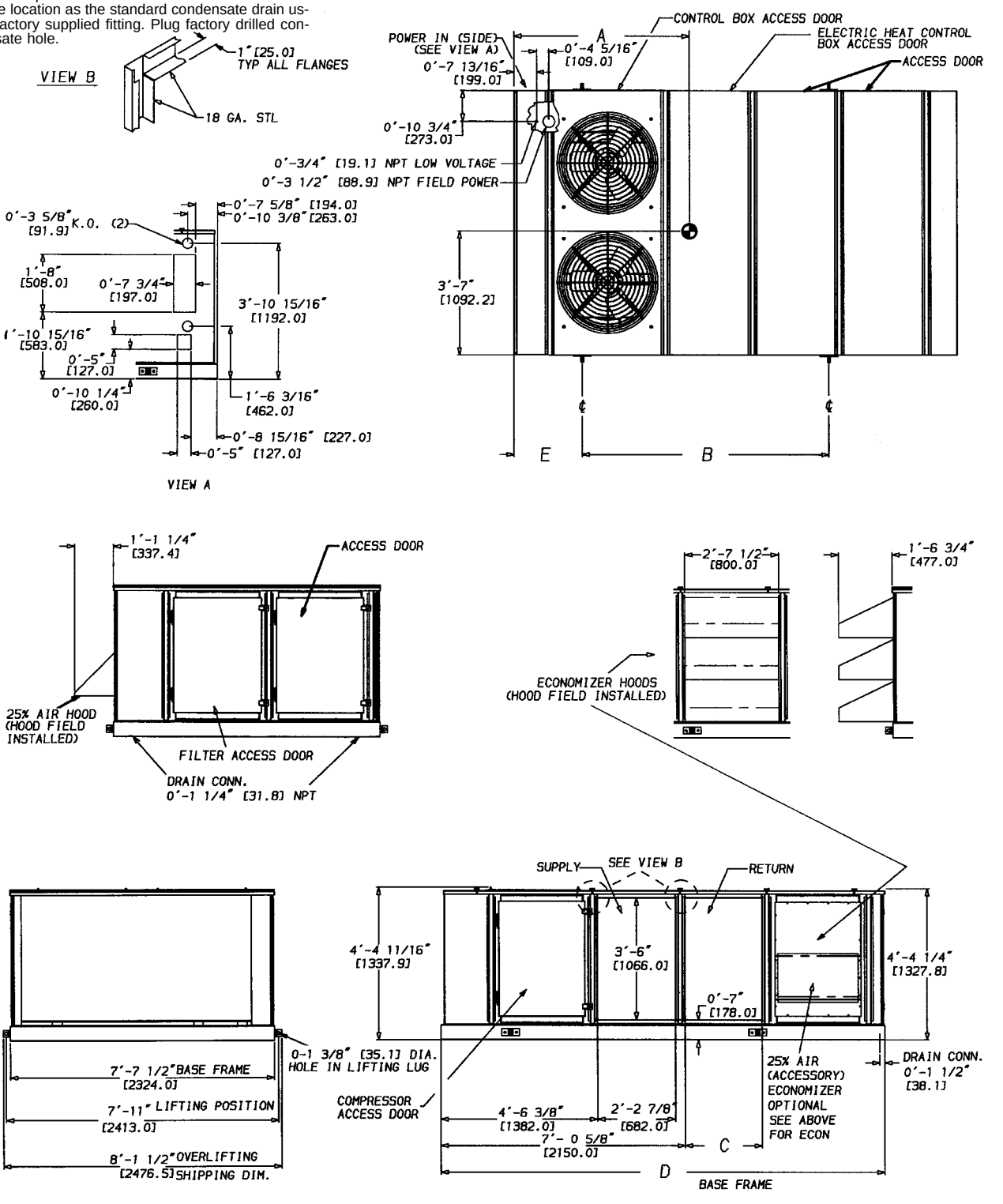


Fig. 3B — Base Unit Dimensions, 50DW,DY

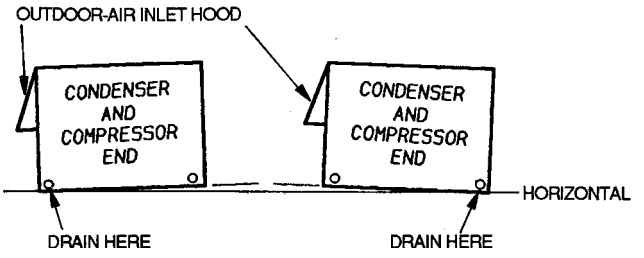


Fig. 4 — Drain Location Selection

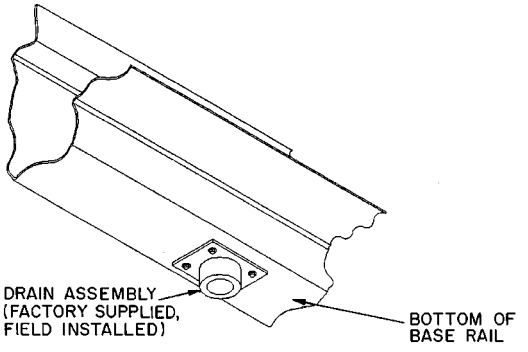
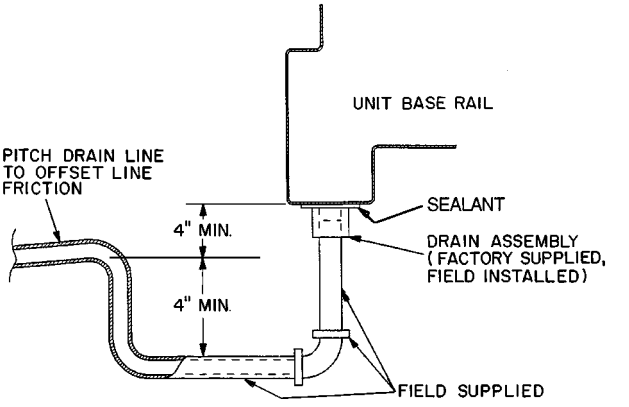
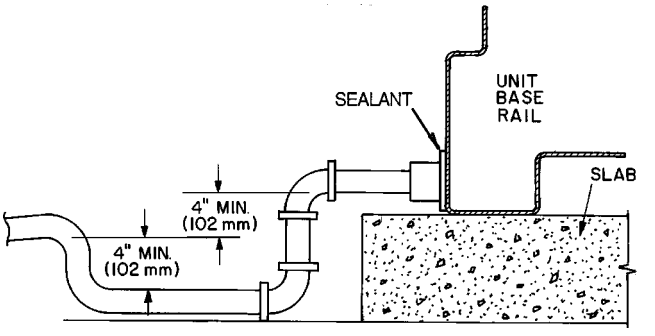


Fig. 5 — Condensate Drain Location



ROOF MOUNT DRAIN



SLAB MOUNT DRAIN

Fig. 7 — Condensate Drain Piping Details

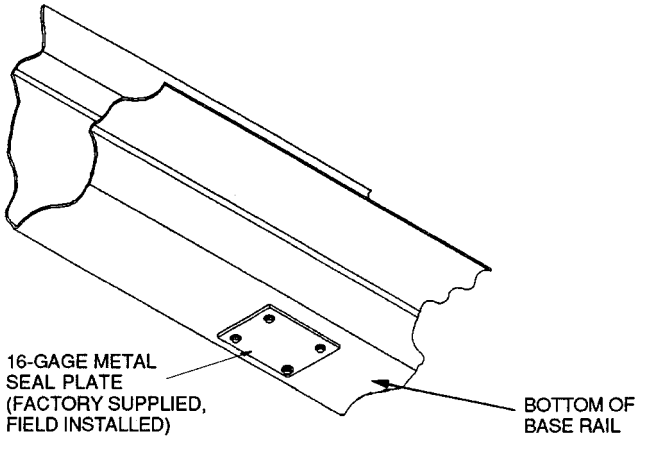


Fig. 6 — Seal Plate Location

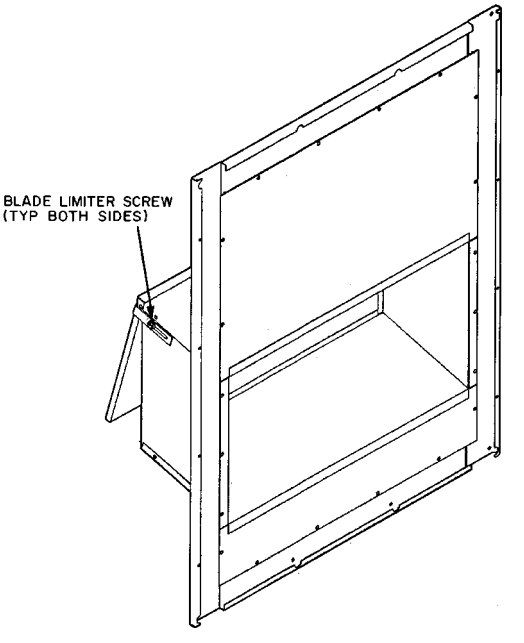


Fig. 8 — Outdoor-Air Damper

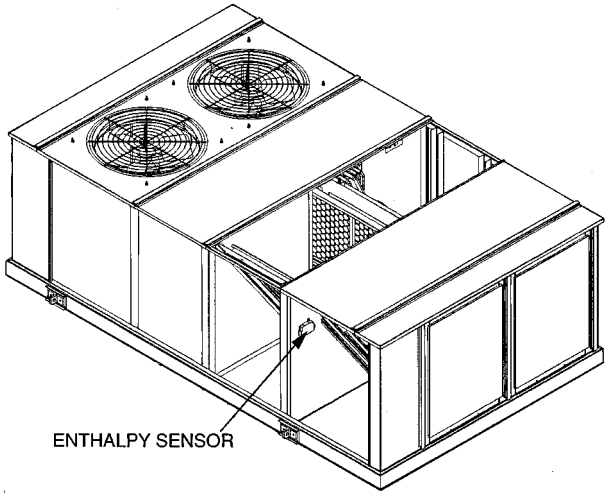


Fig. 9 — Enthalpy Sensor Location

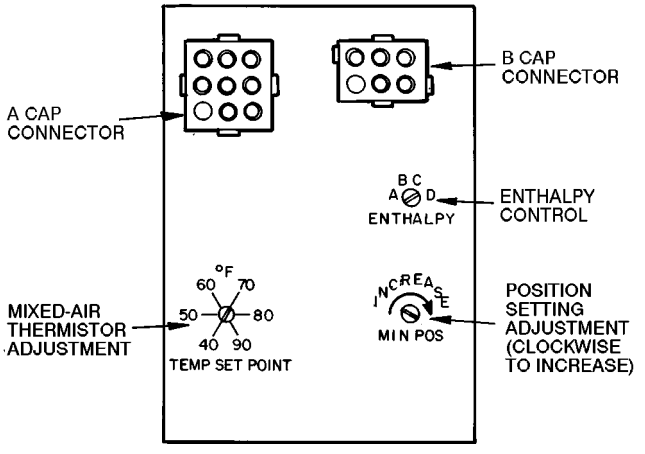


Fig. 10 — Mixed-Air Thermistor and Economizer Position Setting Adjustments (Top of Economizer Motor)

CONTROL CURVE	CONTROL POINT (Approx Deg) AT 50% RH
A	73
B	68
C	63
D	58

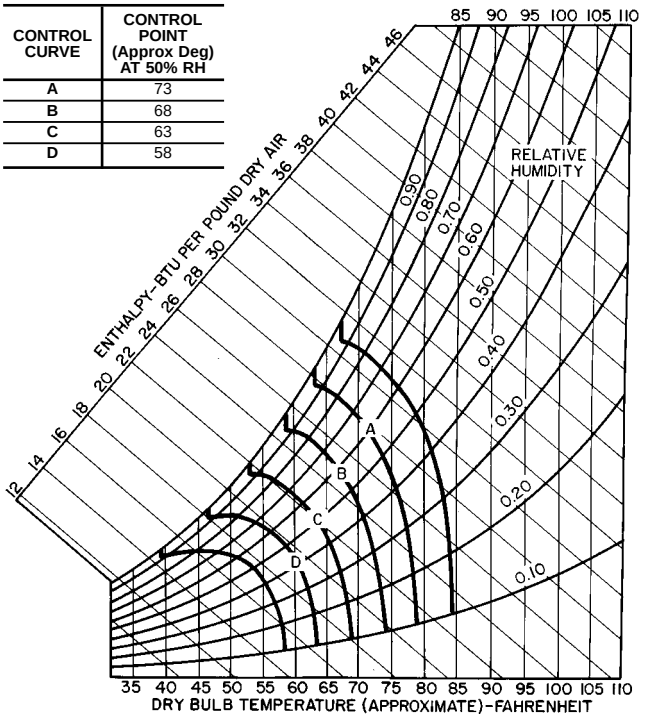


Fig. 11 — Psychrometric Chart for Enthalpy Control

Install Outdoor-Air Hoods

25% OUTDOOR-AIR HOOD — This hood is shipped separately from the base unit, in a carton marked *50DJ900411*. This carton contains:

1 — hood top
1 — hood side, left
1 — hood side, right
1 — fastener package

The fastener package contains:

8 — screws, ¼-in. x ⅝-in. long
1 — ⅛-in. thick x ½-in. wide x 6-ft long seal strip with pressure-sensitive adhesive on one side

See Fig. 12 and remove 10 of the screws holding the 25% outdoor-air damper assembly to the unit. The 10 screws to be removed are the 3 on each side and the 4 in the top.

Apply seal strip from fastener package to the outside edge of the damper assembly, making sure the seal strip covers the holes in the flanges. To ensure a good seal against water, cut the top piece of the seal strip approximately 30 in. long and place it so it extends about one in. past the flange on each side. Cut the side pieces approximately 15¼ in. each, and butt them against the top flange seal strip, running them down the side flanges. With a punch or some other tool, locate the holes in the flanges. Using 6 of the screws removed above, attach both hood sides, flanges pointing outward.

Using the remaining 4 screws removed above, attach hood top. Be sure the side flanges on the hood top go outside the hood sides. Using the screws from the fastener package, attach the hood top side flanges to the hood sides (4 screws per side).

NOTE: The 2 places where the hood top meets hood sides are potential locations for water leakage into the damper opening. Carefully seal both places with field-supplied RTV.

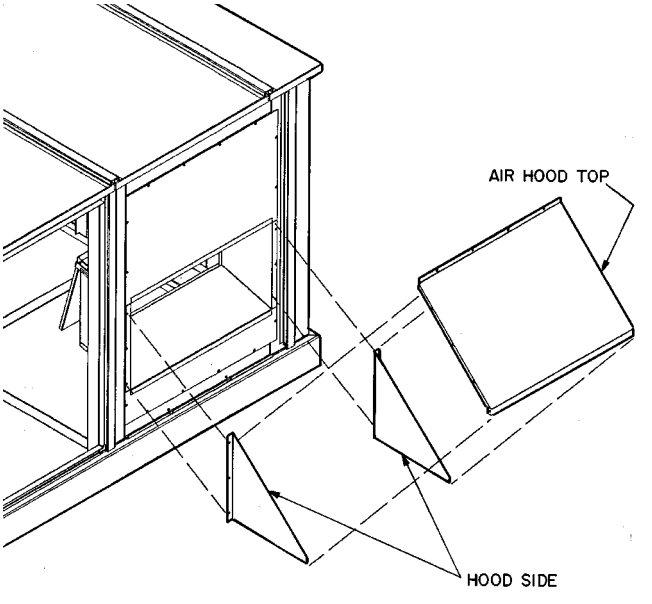


Fig. 12 — 25% Outdoor-Air Hood Installation

ECONOMIZER HOODS — These hoods are shipped separately from the base unit, in a crate marked *50DJ900051*. This carton contains:

3 — preassembled economizer hoods
1 — filter angle
3 — filter retainers
6 — aluminum mesh cleanable filters, 16 in. x 20 in. x 2 in.
2 — channel panels } —see Fig. 13 for cross-section
1 — channel clip
1 — fastener package (taped to a hood)

The fastener package contains:

6 — capscrew bolts, ¼—20 x ½-in. long
6 — nuts, ¼—20
18 — screws, ¼ AB x ⅝-in. long
1 — ⅛-in. thick x ½-in. wide x 8.3 ft long seal strip with pressure-sensitive adhesive on one side

To install hoods:

1. Remove the lagscrews holding the economizer hoods and channel panels to the shipping skid. (There are 4 lagscrews per side.) Remove the lagscrews holding the filter angle and channel clip to the shipping skid. (There are 2 lagscrews per part.)
2. The filters are wrapped to prevent shipping damage. Remove the screws holding the filter retainers to the hoods. (There are 4 screws per retainer.) Remove wrap from filters. Do not reinstall until after the hoods are mounted to the unit.

> IMPORTANT: If unit is to be equipped with either barometric relief or power exhaust, the barometric relief/power exhaust hood must be installed prior to the installation of the economizer hoods. If installing barometric relief or power exhaust, proceed to the Barometric Relief/Constant Volume Power Exhaust Hood section on page 14 and install before proceeding any further. Then return to this point.

3. Place the hoods on a flat surface. Insert the top flange of the middle hood flush with the bottom flange of the top hood AND the top flange of the bottom hood flush with the bottom flange of the middle hood. When properly laid out, the side flanges of the 3 hoods should form one continuous flange.
4. See Fig. 13, and insert the capscrew bolts through the flange holes shown, from the back side, threads facing outward. Note that though there are 12 holes (4 per hood) per side, only the 3 shown per side are to be used.

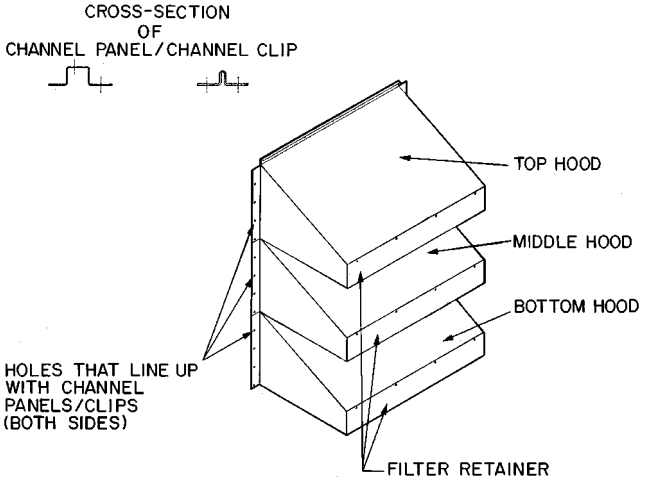


Fig. 13 — Economizer Hood Assembly Holes

5. If unit is not to be equipped with barometric relief or power exhaust, discard the channel clip. If unit is to be equipped with barometric relief or power exhaust, discard one of the channel panels.
6. Cut 2 pieces of seal strip 43¾ in. long for placement on the channel panels (or one channel panel and one channel clip if barometric relief or power exhaust is used) on the flanges with the holes. Begin 1 in. from the top of the flange and center the seal strip on the flange, covering the holes.

   NOTE: If seal strip is too high or too low, water leakage may occur. Maintain the 1 in. dimension for placement.
7. Using a punch or other tool, make holes in the seal strip for screws.
8. Place channel panels on the hood flanges, using the middle 3 holes. If using barometric relief or power exhaust, use the channel clip in place of the previously discarded channel panel, attaching it to the left side of the economizer hoods (left side when facing hoods). Secure channel panels and/or channel clip to the hoods using 6 of the nuts from the fastener package. See Fig. 14 and place economizer hood assembly over outdoor-air opening.

> **⚠ CAUTION**
>
> Economizer hood assembly is heavy and requires at least 2 people to handle it.

9. Line up the holes in the right channel panel with the holes in the flange of the corner post. On 50DJ,DK units, line up the holes on the left channel panel with the holes on the flange of the panel next to the economizer section. On 50DW,DY units, line up the holes on the left channel panel with the holes in the flange of the return duct flange. On units with barometric relief or power exhaust, line up the holes in the channel clip with the holes in the fan deck. (It is necessary to remove the top and bottom screws from the fan deck, to install

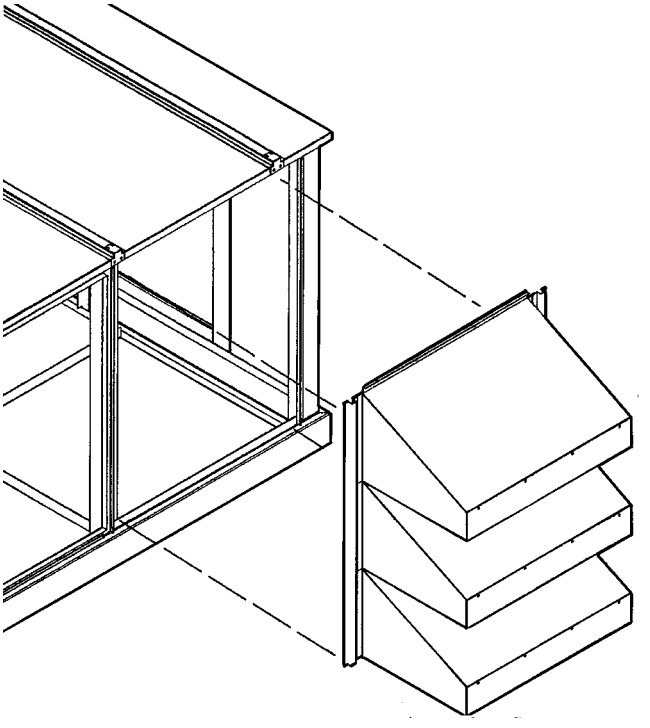


Fig. 14 — Economizer Hood Installation

economizer hood assembly.) Once economizer hood assembly is in place, secure it using 10 of the screws from the fastener package (5 per side).

10. Using 2 of the screws from the fastener package, attach the top flange of the economizer hood assembly to the unit top rail. The holes in the top rail are behind the top rail gasket.
11. Using 4 screws from the fastener package, attach top and bottom of the channel panels and/or clips to the top rail and the base rail. Again, the holes in the top rail and the base rail will be covered by gasketing.
12. Attach filter angle to base rail, using 2 screws from fastener package. Since the holes are covered by the base rail gasket, locate and punch them out before attaching the filter angle.
13. Seal any small gaps between flanges and at the top with RTV to prevent water leakage.
14. Reinstall filters and filter retainers using screws removed earlier.

BAROMETRIC RELIEF/CONSTANT VOLUME POWER EXHAUST HOOD — The same hood is used for barometric relief and power exhaust, and is shipped separately from the base unit, in cartons marked *50DJ900371* for 024 units, and marked *50DJ900381* for 028 and 030 units.

Barometric relief can only be unit mounted on vertical supply/return units (50DJ,DK).

Power exhaust (for constant volume units only) can only be unit mounted on vertical supply/return units (50DJ). Accessory constant volume power exhaust may be duct mounted on horizontal supply/return unit 50DW.

IMPORTANT: Modulating power exhaust is for VAV units only and is unit mounted only on vertical supply/return unit 50DK. See Modulating Power Exhaust Hood section on this page. If using power exhaust, the return duct must have a 90-degree elbow below the unit to comply with ANSI (American National Standards Institute) codes.

Cartons contain:

1 — preassembled hood/damper assembly
1 — fastener package (taped to inside of hood)

The fastener package contains:

6 — screws, ¼ AB x ⅝-in. long
2 — seal strips 36-in. long x 1-in. wide x ⅛-in. thick, with pressure-sensitive adhesive on one side
2 — seal strips, 33-in. long x 1-in. wide x ⅛-in. thick, with pressure-sensitive adhesive on one side

To install hood:

1. Remove the lagscrews holding hood assembly to shipping skid. See Fig. 15. Before installing the hood on the unit, remove the channel panel attached to the barometric relief/power exhaust fan deck and the compressor access door. Also, remove the middle 2 screws holding the fan deck to the base rail.
2. Apply the 36-in. long seal strips to the side flanges of the hood assembly. Apply the 33-in. long seal strips to the top and bottom flanges of the hood assembly. (On 024 units, which have narrower hoods than 028 and 030 units, trim the excess seal strip as needed.) Make seal strips flush with the outer edges of the flanges. Use a punch to punch out holes for the screws.

⚠ CAUTION

Hood assembly is heavy and requires at least 2 people to handle it.

3. Line up the top flange of the hood assembly with the 6 holes in the fan deck (approximately 6½ in. from the top). Using the 6 screws from the fastener package, secure the top flange of the hood assembly to the fan deck. Reinstall the 2 screws attaching the fan deck to the base rail. (The holes in the bottom flange of the hood assembly should line up with these holes.)
4. Reinstall the channel panel between the fan deck and the compressor access door. The 3 holes in the left side flange of the hood assembly should line up with the corresponding holes in the fan deck and the channel panel. The 3 holes in the right side flange of the hood assembly should line up with the holes in the fan deck and the holes in the channel clip described in Economizer Hoods section on page 13. Unit is now ready for installation of the economizer hoods.

MODULATING POWER EXHAUST HOOD — The hood for modulating power exhaust is shipped separately from the base unit, in cartons marked 50DJ900571 for 50DK024 units, and marked 50DJ900581 for 50DK028 and 030 units.

Factory-installed modulating power exhaust can only be unit mounted on 50DK vertical supply/return VAV unit. If using modulating power exhaust, the return duct must have a 90-degree elbow below the unit to comply with ANSI codes. Accessory, field-installed, modulating power exhaust may be duct mounted on 50DY units.

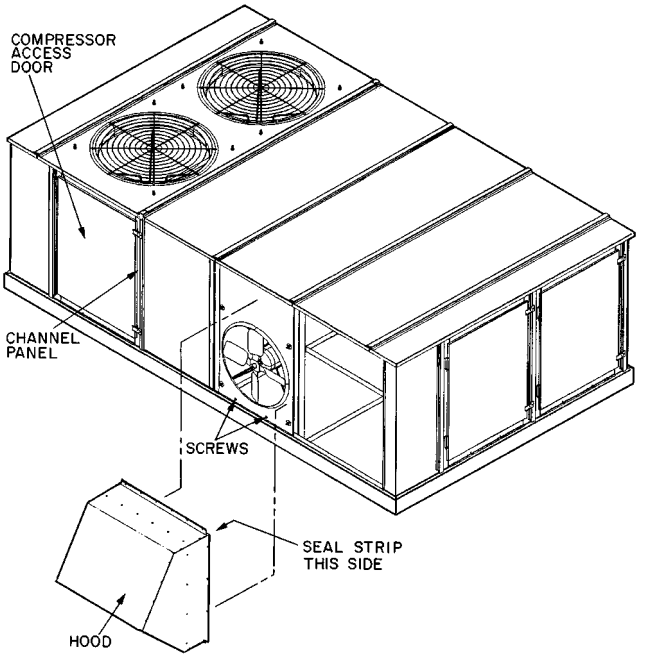


Fig. 15 — Power Exhaust/Barometric Relief Hood

Cartons contain:

1 — preassembled hood/damper/motor assembly
1 — fastener package (taped to inside of hood)

The fastener package contains:

6 — screws, ¼ AB x ⅝-in. long
2 — seal strips, 36-in. long x 1-in. wide x ⅛-in. thick, with pressure-sensitive adhesive on one side
2 — seal strips, 33-in. long x 1-in. wide x ⅛-in. thick, with pressure-sensitive adhesive on one side

To install hood:

1. Remove the lagscrews holding the hood assembly to the shipping skid. See Fig. 15.
2. Remove the channel panel attached to the fan deck and the compressor access door frame. Also remove the middle 2 screws that hold the fan deck to the unit base rail.
3. Apply the 36-in. long seal strips to the side flanges of the hood/damper/motor assembly. Apply the 33-in. long seal strips to the top and bottom flanges. (On 024 units, which have narrower hoods than 028 and 030 units, trim the excess seal strip as needed.) Make seal strips flush with the outer edges of the flanges. Use a punch to punch out holes for the screws. When viewed facing the hood, the right side of the hood assembly has 2 side panels. The lower one is removable for access to the damper motor. Slit the side seal strip at the point where the 2 side panels meet to facilitate removal of the lower panel during servicing.
4. Reach in through the fan deck orifice and locate the plug secured to the partition which separates the return air from the outdoor air. Route this plug through the grommet in the hole in the lower part of the power exhaust fan deck. Hang the plug on the fan orifice while attaching the hood to the unit.

⚠ CAUTION

Hood assembly is heavy and requires at least 2 people to handle it.

5. Line up the top flange of the hood assembly with the 6 holes in the fan deck (approximately 6½ in. from the top). Using the 6 screws from the fastener package, secure the top flange of the hood assembly to the fan deck. Reinstall the 2 screws attaching the fan deck to the unit base rail. (The holes in the bottom flange of the hood assembly should line up with these holes.) Remove the 8 screws securing the lower side plate to the right side of the hood. This provides access to the modulating power exhaust damper motor. Connect the plug from the damper motor to the plug previously pulled through the fan deck. Reinstall the lower side plate using the 8 screws just removed.
6. Reinstall the channel panel between the modulating power exhaust and the compressor access door frame. The 3 holes in the left side flange of the hood assembly should line up with the corresponding holes in the fan deck and channel panel. The 3 holes in the right side flange of the hood assembly should line up with the holes in the fan deck and the holes in the channel clip described in Economizer Hoods section on page 13. Unit is now ready for installation of economizer hoods.

Static Pressure Control Plastic Tubing (See Fig. 16) — On units with inlet guide vanes or modulating power exhaust, a ¼-in. plastic tubing must be run from the high-pressure tap on the differential pressure switches into the building.

The pressure tube for units with optional inlet guide vanes must be connected to a tap in the supply-air duct. This tap is usually located two-thirds of the way out on the main trunk duct to achieve proper supply duct pressure control.

On units with accessory modulating power exhaust, the pressure tube for the power exhaust must be terminated in the conditioned space where a constant pressure is required. This location is usually in an entrance lobby so that the building exterior doors will open and close properly.

See Fig. 16 for tubing connection diagram. Low-pressure connections are factory installed to all devices. High-pressure connections must be field-supplied between devices in Fig. 16 and proper building locations as shown.

Field Wire Routing — Field wiring can be brought into unit from the bottom (through basepan and roof curb) or through the side of unit (corner post next to control box).

A 3½ in. NPT coupling for field power wiring and a ¾-in. NPT coupling for 24-v control wiring are provided in basepan. In the side post, there are two 3⅝ in. knockouts for the field power wiring. If control wiring is to be brought in through the side of unit, a ⅞-in. diameter hole must be drilled in the condenser side post next to the control box.

There are 2 large block-off plates in the corner post. The smaller block-off (5 in. x 5 in.) is used to provide access to main unit control box during installation of power wiring. The larger block-off (7¾ in. wide x 20 in. high) is located between the two 3⅝ in. knockouts and is used when a 400-amp disconnect box is required.

If disconnect box is mounted to corner post, be careful not to drill any screws into the condenser coil. The corner post is marked to indicate the area where it is safe to drill holes and install screws.

ROUTING THROUGH BOTTOM OF UNIT — If wiring is brought in through bottom of unit, use field-supplied watertight conduit to run power wiring from basepan out through bottom 3⅝ in. knockout to the disconnect box and back into unit to the main control box. When 200-amp or smaller disconnect is used, the disconnect box should be located so that wiring can be run from back of disconnect box to unit through top 3⅝ in. knockout. Watertight strain relief (field-supplied) must be used in knockout. When 400-amp disconnect is used, remove 7¾ in. x 20 in. block-off in corner post and use field-supplied elbow to route conduit through corner post to the control box.

Use strain relief going into control box through 4½ in. diameter hole provided. After wires are in unit control box, connect to power terminal block (see Power Wiring).

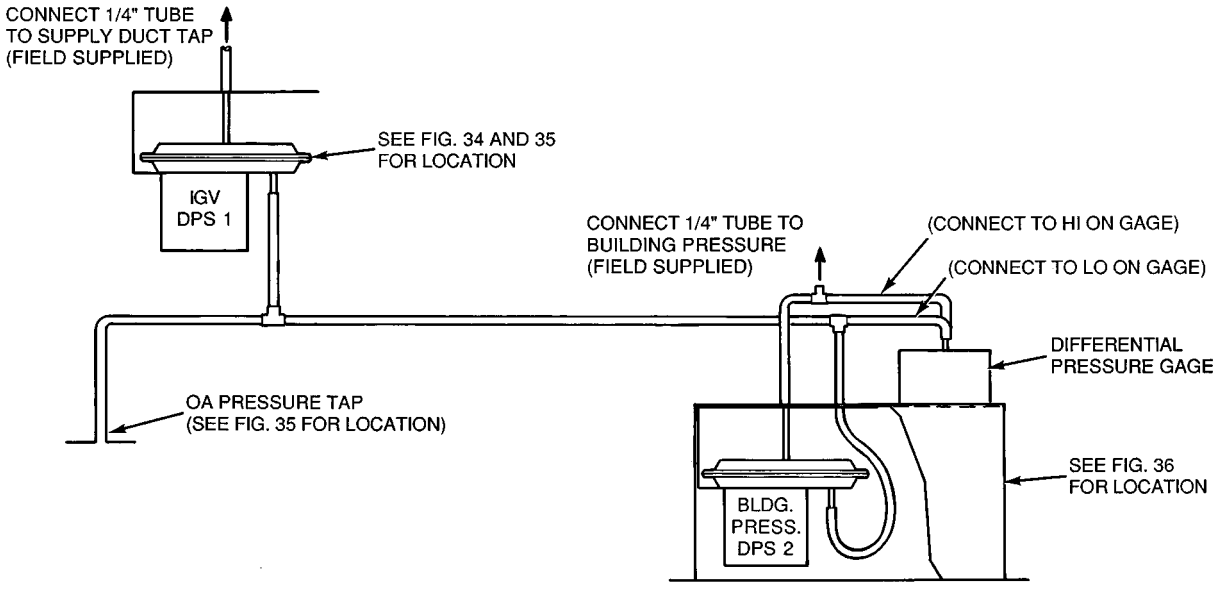
Low voltage wiring must be run in watertight conduit from the basepan to control box and through 1-in. diameter hole provided in upper righthand corner of unit control box. Field-supplied strain relief must be used going into the box. After wiring is in control box, make connections to proper terminals on terminal blocks (see Control Wiring sections on pages 17 and 26).

ROUTING THROUGH SIDE OF UNIT — When 200-amp or smaller disconnect is used, route power wiring in field-supplied watertight conduit into unit through 3⅝ in. knockout. Strain relief (field-supplied) must be used in knockout. When 400-amp disconnect is used, remove 7¾ in. x 20 in. block-off in corner post and use field-supplied elbow to route conduit through corner post to the control box.

Use field-supplied strain relief going into control box through 4½ in. diameter hole provided. After wires are in unit control box, connect to power terminal block (see Power Wiring section on page 16).

Bring low voltage control wiring through field-drilled ⅞-in. diameter hole in condenser side post. Use strain relief going into 1-in. diameter hole in upper righthand corner of unit control box.

After wiring is in control box, make connection to proper terminals on terminal blocks (see Control Wiring sections on pages 17 and 26).



LEGEND

DPS — Differential Pressure Switch
IGV — Inlet Guide Vanes
OA — Outdoor Air

Fig. 16 — Tubing Connection Diagram

Field Electrical Connections

IMPORTANT: The VAV units (50DK,DY) generate, use, and can radiate radio frequency energy. If units are not installed and used in accordance with these instructions, they may cause radio interference. Units have been tested and found to comply with limits of a Class A computing device as defined by FCC (Federal Communications Commission) regulations, Subpart J of Part 15, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

POWER WIRING — Units are factory wired for the voltage shown on the unit nameplate. The main terminal block is suitable for use with aluminum or copper wires, with the following exceptions. When the 50DW028, 208/230-v units with alternate evaporator-fan motor or the 50DW030, 208/230-v unit are used with 90 kW electric heat, they will accept only copper wire (75° C). However, if 85° C or larger wire is used, these units will also accept aluminum wire. Power terminal blocks will accept a maximum of 4/0 wire.

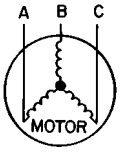
When installing units, provide a disconnect per NEC (National Electrical Code) of adequate size (MOCP [Maximum Overcurrent Protection] of unit is on the informative plate). All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 17 for power wiring connections to the unit power terminal block and equipment ground.

Operating voltage to the compressor must be within the voltage range indicated on the unit nameplate. Voltages between phases must be balanced within 2%, and the current must be balanced within 10%. See Tables 2-7 for unit electrical data.

Use the following formula to determine the percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB =452 v
BC =464 v
AC =455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

Determine maximum deviation from average voltage:

(AB) 457 − 452 = 5 v
(BC) 464 − 457 = 7 v
(AC) 457 − 455 = 2 v

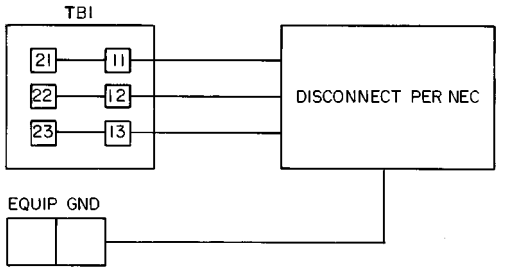
Maximum deviation is 7 v.

Determine percent of voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact local utility immediately.



LEGEND

EQUIP — Equipment
GND — Ground
NEC — National Electrical Code
TB — Terminal Block

Fig. 17 — Field Power Wiring Connections

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

CONTROL WIRING, CV UNITS (DJ,DW) — Install a Carrier-approved accessory thermostat assembly according to the installation instructions shipped with the accessory. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature. Route thermostat cable or equivalent leads of no. 18 AWG (American Wire Gage) colored wire from subbase terminals to 24-v terminal strip (P1). The terminal strip is located on the CV control board on units with no economizer and on the economizer board on units with the economizer option (see Fig. 18).

The total wire length between the unit and the thermostat and the return wire from the thermostat to the unit should not exceed the following limits: 50 ft of 18 AWG, 80 ft of 16 AWG or 125 ft of 14 AWG. See Fig. 19 for field wiring connections between the thermostat and the unit 24-v terminal block.

There are no required 115-v field wiring connections, therefore no provisions have been made in the unit for running 115-v wiring. If any of the field-installed options requiring 115-v connections are desired, the unit must be modified in the field for 115-v wiring.

Options requiring 24-v or 115-v control wiring are listed below.

Building Pressurization or Smoke Purge Mode — Refer to Start-Up, Building Pressurization Mode and Smoke Purge Mode sections on pages 43 and 44 for additional information. See Fig. 20 and unit wiring label for wiring details.

24-V Connections:

1. Firestat or smoke detector (field-supplied switch 1) — Remove factory-installed jumper wire and wire a field-supplied firestat or smoke detector between terminals 2 and 3 on terminal block 2 in the unit control box (see Fig. 18 for the location of terminal block 2 in the control box).
2. Switch to supply 24-v power to the economizer motor during building pressurization or smoke purge (field-supplied switch 5) — Wire a normally-open switch between terminal 3 on terminal block 2 and terminal T2 in the economizer motor.
3. Switch to open economizer outdoor-air damper during building pressurization or smoke purge (field-supplied switch 6) — Wire a field-supplied switch between terminals 8 and 9 on the economizer motor (in top of economizer motor). When this switch is manually closed, it will drive the outdoor-air damper fully open.
4. Switch to isolate economizer motor from evaporator-fan motor (field-supplied switch 7) — Wire a normally-closed switch between T2 on economizer motor and PL8 terminal 1.

115-V Connections:

1. Building pressurization switch (field-supplied switch 2) — Wire a field-supplied switch between terminal 4 on terminal block 2 and the C1 connection on the evaporator (indoor) fan contactor coil (IFC1 on unit label diagram).
2. Smoke purge switch (field-supplied switch 4) — Wire a field-supplied switch between terminal 4 on terminal block 2 (in the unit control box) and the C1 connection on the power exhaust contactor coil (PEC1 on unit label diagram).
3. Switch to isolate evaporator-fan motor from power exhaust motor during building pressurization or smoke purge (field-supplied switch 3) — Wire a field-supplied switch in series with the wire from the C1 connection on the evaporator (indoor) fan contactor coil (IFC1 on unit label diagram) to the red wire on the economizer damper motor end switch (EDMS on unit label diagram).

Convenience Outlet

115-V Connection: Convenience outlet can be mounted on panel containing control circuit breakers CB3 and 4. (See Fig. 18.) Remove sheet metal cover that conceals 2⅝ by 1⁷⁄₁₆ in. hole and install outlet in hole. Wire between terminals 4 and 5 on terminal block 2 in the unit control box (see Fig. 21). The convenience outlet should be ground fault protected.

Table 2 — Electrical Data — 50DJ,DW024

NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OFM	IFM		POWER EXHAUST FAN MOTOR*	ELECTRIC HEAT		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Total FLA	Hp	FLA	FLA	kW	FLA	MCA	MOCP Fuse Only
208/230-3-60	187	254	43.3	228	31.5	160	6.4	5.0†	15.2	— 6.6/6.0 — 6.6/6.0 — 6.6/6.0 — 6.6/6.0 —	— — 15/18 15/18 29/36 29/36 59/72* 59/72* 74/90††	— — 40.9/ 45.2 40.9/ 45.2 81.8/ 90.4 81.8/ 90.4 163.6/181.0 163.6/181.0 204.5/225.9	108.5/108.5 115.1/114.5 108.5/108.5 115.1/114.5 121.2/132.0 121.2/132.0 223.5/245.2 223.5/245.2 274.6/301.4	150/150 150/150 150/150 150/150 150/150 150/150 225/250 225/250 300/350
								7.5†	22.0	— 6.6/6.0 — 6.6/6.0 — 6.6/6.0 — 6.6/6.0 —	— — 15/18 15/18 29/36 29/36 59/72* 59/72* 74/90††	— — 40.9/ 45.2 40.9/ 45.2 81.8/ 90.4 81.8/ 90.4 163.6/181.0 163.6/181.0 204.5/225.9	115.3/115.3 121.9/121.3 115.3/115.3 121.9/121.3 129.8/140.5 129.8/140.5 232.0/253.8 283.1/309.9 232.0/253.8	150/150 150/150 150/150 150/150 150/175 150/175 250/300 300/350 250/300
								5.0**	12.4	— 6.6/6.0 — 6.6/6.0 — 6.6/6.0 — 6.6/6.0 —	— — 15/18 15/18 29/36 29/36 59/72* 59/72* 74/90††	— — 40.9/ 45.2 40.9/ 45.2 81.8/ 90.4 81.8/ 90.4 163.6/181.0 163.6/181.0 204.5/225.9	105.7/105.7 112.3/111.7 105.7/105.7 112.3/111.7 117.7/128.5 117.7/128.5 220.0/241.7 220.0/241.7 271.1/297.9	125/125 150/150 125/125 150/150 125/125 150/150 225/250 225/250 300/300
								7.5**	19.6	— 6.6/6.0 — 6.6/6.0 — 6.6/6.0 — 6.6/6.0 —	— — 15/18 15/18 29/36 29/36 59/72* 59/72* 74/90††	— — 40.9/ 45.2 40.9/ 45.2 81.8/ 90.4 81.8/ 90.4 163.6/181.0 163.6/181.0 204.5/225.9	112.9/112.9 119.5/118.9 112.9/112.9 119.5/118.9 126.7/137.5 126.7/137.5 229.0/250.7 229.0/250.7 280.1/306.9	150/150 150/150 150/150 150/150 150/150 150/150 250/300 250/300 300/350
460-3-60	414	508	22.1	114	15.7	80	3.2	5.0†	7.2	— 3.0 — 3.0 — 3.0 — 3.0 —	— — 18 18 36 36 90 90	— — 22.6 22.6 45.2 45.2 113.0 113.0	53.7 56.7 53.7 56.7 65.5 65.5 150.2 150.2	70 70 70 70 70 70 175 175
								7.5†	10.5	— 3.0 — 3.0 — 3.0 — 3.0 —	— — 18 18 36 36 90 90	— — 22.6 22.6 45.2 45.2 113.0 113.0	57.0 60.0 57.0 60.0 69.6 69.6 154.4 154.4	70 80 70 80 80 80 175 175
								5.0**	6.2	— 3.0 — 3.0 — 3.0 — 3.0 —	— — 18 18 36 36 90 90	— — 22.6 22.6 45.2 45.2 113.0 113.0	52.7 55.7 52.7 55.7 64.2 64.2 149.0 149.0	70 70 70 70 70 70 150 150
								7.5**	9.8	— 3.0 — 3.0 — 3.0 — 3.0 —	— — 18 18 36 36 90 90	— — 22.6 22.6 45.2 45.2 113.0 113.0	56.3 59.3 56.3 59.3 68.7 68.7 153.5 153.5	70 80 70 80 80 80 175 175
575-3-60	518	632	17.9	91	12.6	64	4.8	5.0†	5.6	— 2.4 — 2.4 — 2.4 —	— — 36 36 72* 72* 90††	— — 36.1 36.1 72.3 72.3 90.4	45.4 47.8 52.1 52.1 97.4 97.4 120.0	60 60 60 60 125 125 125
								7.5†	8.6	— 2.4 — 2.4 — 2.4 —	— — 36 36 72* 72* 90††	— — 36.1 36.1 72.3 72.3 90.4	48.4 50.8 55.9 55.9 101.1 101.1 123.7	60 60 70 70 125 125 125

(See Legend on Page 19.)

Table 3 — Electrical Data — 50DJ,DW028

NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OFM	IFM		POWER EXHAUST FAN MOTOR*	ELECTRIC HEAT		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Total FLA	Hp	FLA	FLA	kW	FLA	MCA	MOCP Fuse Only
208/230-3-60	187	254	63.6	266	39.7	198	10.8	7.5†	22.0	—	—	—	152.0/152.0	200/200
										6.6/6.0	—	—	158.6/158.0	200/200
										—	15/18	40.9/ 45.2	152.0/152.0	200/200
										6.6/6.0	15/16	40.9/ 45.2	158.6/158.0	200/200
										—	29/36	81.8/ 90.4	152.0/152.0	200/200
										6.6/6.0	29/36	81.8/ 90.4	158.6/158.0	200/200
										—	59/72*	163.6/181.0	232.0/253.8	250/300
										6.6/6.0	59/72*	163.6/181.0	232.0/253.8	250/300
										—	74/90††	204.5/225.9	283.1/309.9	300/350
								10.0†	26.4	—	—	—	156.4/156.4	200/200
										6.6/6.0*	—	—	163.0/162.4	225/225
										—	15/18	40.9/ 45.2	156.4/156.4	200/200
										6.6/6.0*	15/18	40.9/ 45.2	163.0/162.4	225/225
										—	29/36	81.8/ 90.4	156.4/156.4	200/200
										6.6/6.0*	29/36	81.8/ 90.4	163.0/162.4	225/225
										—	59/72*	163.6/181.0	237.5/259.2	250/300
										6.6/6.0*	59/72*	163.6/181.0	237.5/259.2	250/300
										—	74/90††	204.5/225.9	288.6/315.4	300/350
								7.5**	19.6	—	—	—	149.6/149.6	200/200
										6.6/6.0*	—	—	156.2/155.6	200/200
										—	15/18	40.9/ 45.2	149.6/149.6	200/200
										6.6/6.0*	15/18	40.9/ 45.2	156.2/155.6	200/200
										—	29/36	81.8/ 90.4	149.6/149.6	200/200
										6.6/6.0*	29/36	81.8/ 90.4	156.2/155.6	200/200
										—	59/72*	163.6/181.0	229.0/250.7	250/300
										6.6/6.0*	59/72*	163.6/181.0	229.0/250.7	250/300
										—	74/90††	204.5/225.9	280.1/306.9	300/350
								10.0**	24.2	—	—	—	154.2/154.2	200/200
										6.6/6.0*	—	—	160.8/160.2	200/200
										—	15/18	40.9/ 45.2	154.2/154.2	200/200
										6.6/6.0*	15/18	40.9/ 45.2	160.8/160.2	200/200
										—	29/36	81.8/ 90.4	154.2/154.2	200/200
										6.6/6.0*	29/36	81.8/ 90.4	160.8/160.2	200/200
										—	59/72*	163.6/181.0	234.7/256.5	250/300
										6.6/6.0*	59/72*	163.6/181.0	234.7/256.5	250/300
										—	74/90††	204.5/225.9	285.9/312.6	300/350
460-3-60	414	508	28.6	120	19.9	99	5.4	7.5†	10.5	—	—	—	71.5	100
										3.0	—	—	74.5	100
										—	18	22.6	71.5	100
										3.0	18	22.6	74.5	100
										—	36	45.2	71.5	100
										3.0	36	45.2	74.5	100
										—	90*	113.0	154.4	175
										3.0	90*	113.0	154.4	175
										—	108††	135.6	182.6	200
								10.0†	12.5	—	—	—	73.5	100
										3.0	—	—	76.5	100
										—	18	22.6	73.5	100
										3.0	18	22.6	76.5	100
										—	36	45.2	73.5	100
										3.0	36	45.2	76.5	100
										—	90*	113.0	156.9	175
										3.0	90*	113.0	156.9	175
										—	108††	135.6	185.1	200
								7.5**	9.8	—	—	—	70.8	90
										3.0	—	—	73.8	100
										—	18	22.6	70.8	90
										3.0	18	22.6	73.8	100
										—	36	45.2	70.8	90
										3.0	36	45.2	73.8	100
										—	90*	113.0	153.5	175
										3.0	90*	113.0	153.5	175
										—	108††	135.6	181.7	200
								10.0**	12.2	—	—	—	73.2	100
										3.0	—	—	76.2	100
										—	18	22.6	73.2	100
										3.0	18	22.6	76.2	100
										—	36	45.2	73.2	100
										3.0	36	45.2	76.2	100
										—	90*	113.0	156.5	175
										3.0	90*	113.0	156.5	175
										—	108††	135.6	184.7	200
575-3-60	518	632	22.9	96	15.9	79	4.8	7.5†	8.6	—	—	—	57.9	80
										2.4	—	—	60.3	80
										—	36	36.1	57.9	80
										2.4	36	36.1	60.3	80
										—	72*	72.3	101.1	125
										2.4	72*	72.3	101.1	125
										—	108††	108.4	146.2	150
								10.0†	11.6	—	—	—	60.9	80
										2.4	—	—	63.3	80
										—	36	36.1	60.9	80
										2.4	36	36.1	63.3	80
										—	72*	72.3	104.9	150
										2.4	72*	72.3	104.9	150
										—	108††	108.4	150.0	150

FLA — Full Load Amps
Hp — Nominal Horsepower
IFM — Evaporator (Indoor) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (for wire sizing)
MOCP — Maximum Overcurrent Protection
OFM — Condenser (Outdoor) Fan Motor
RLA — Rated Load Amps

*50DJ units only.
†Standard efficiency.
**High efficiency.
††50DW units only.

(208/230, 460 V Only)

Table 4 — Electrical Data — 50DJ,DW030

NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OFM	IFM		POWER EXHAUST FAN MOTOR*	ELECTRIC HEAT		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Total FLA	Hp	FLA	FLA	kW	FLA	MCA	MOCP Fuse Only
208/230-3-60	187	254	63.6	266	44.3	228	10.8	10.0†	26.4	—	—	—	161.0/161.0	200/200
										6.6/6.0	—	—	167.6/167.0	225/225
										—	15/18	40.9/ 45.2	161.0/161.0	200/200
										6.6/6.0	15/18	40.9/ 45.2	167.6/167.0	225/225
										—	29/36	81.8/ 90.4	161.0/161.0	200/200
										6.6/6.0	29/36	81.8/ 90.4	167.6/167.0	225/225
										—	59/72*	163.6/181.0	237.5/259.2	250/300
										6.6/6.0	59/72*	163.6/181.0	237.5/259.2	250/300
										—	74/90††	204.5/225.9	288.6/315.4	300/350
								15.0†	42.0	—	—	—	176.6/176.6	225/225
										6.6/6.0	—	—	183.2/182.6	225/225
										—	15/18	40.9/ 45.2	176.6/176.6	225/225
										6.6/6.0	15/18	40.9/ 45.2	183.2/182.6	225/225
										—	29/36	81.8/ 90.4	176.6/176.6	225/250
										6.6/6.0	29/36	81.8/ 90.4	183.2/182.6	225/250
										—	59/72*	163.6/181.0	257.0/278.8	300/300
										6.6/6.0	59/72*	163.6/181.0	257.0/278.8	300/300
										—	74/90††	204.5/225.9	308.1/334.9	350/350
								10.0**	24.2	—	—	—	158.8/158.8	200/200
										6.6/6.0	—	—	165.4/164.8	225/225
										—	15/18	40.9/ 45.2	158.8/158.8	200/200
										6.6/6.0	15/18	40.9/ 45.2	165.4/164.8	225/225
										—	29/36	81.8/ 90.4	158.8/158.8	200/200
										6.6/6.0	29/36	81.8/ 90.4	165.4/164.8	225/225
										—	59/72*	163.6/181.0	234.7/256.5	250/300
										6.6/6.0	59/72*	163.6/181.0	234.7/256.5	250/300
										—	74/90††	204.5/225.9	285.9/312.6	300/350
								15.0**	36.6	—	—	—	171.2/171.2	225/225
										6.6/6.0	—	—	177.8/177.2	225/225
										—	15/18	40.9/ 45.2	171.2/171.2	225/225
										6.6/6.0	15/18	40.9/ 45.2	177.8/177.2	225/225
										—	29/36	81.8/ 90.4	171.2/171.2	225/225
										6.6/6.0	29/36	81.8/ 90.4	177.8/177.2	225/225
										—	59/72*	163.6/181.0	250.2/272.0	300/300
										6.6/6.0	59/72*	163.6/181.0	250.2/272.0	300/300
										—	74/90††	204.5/225.9	301.4/328.1	350/350
460-3-60	414	508	30.0	120	22.1	114	5.4	10.0†	12.5	—	—	—	77.5	100
										3.0	—	—	80.5	110
										—	18	22.6	77.5	100
										3.0	18	22.6	80.5	110
										—	36	45.2	77.5	100
										3.0	36	45.2	80.5	110
										—	90*	113.0	156.9	175
										3.0	90*	113.0	156.9	175
										—	108††	135.6	185.1	200
								15.0†	20.0	—	—	—	85.0	110
										3.0	—	—	88.0	110
										—	18	22.6	85.0	110
										3.0	18	22.6	88.0	110
										—	86	45.2	85.0	125
										3.0	36	45.2	88.0	125
										—	90*	113.0	166.2	175
										3.0	90*	113.0	166.2	175
										—	108††	135.6	194.5	200
								10.0**	12.2	—	—	—	77.2	100
										3.0	—	—	80.2	110
										—	18	22.6	77.2	100
										3.0	18	22.6	80.2	110
										—	36	45.2	77.2	100
										3.0	36	45.2	80.2	110
										—	90*	113.0	156.5	175
										3.0	90*	113.0	156.5	175
										—	108††	135.6	184.7	200
								15.0**	18.3	—	—	—	83.3	110
										3.0	—	—	86.3	110
										—	18	22.6	83.3	110
										3.0	18	22.6	86.3	110
										—	36	45.2	83.3	110
										3.0	36	45.2	86.3	110
										—	90*	113.0	164.1	175
										3.0	90*	113.0	164.1	175
										—	108††	135.6	192.4	200
575-3-60	518	632	22.9	96	17.9	91	4.8	10†	11.6	—	—	—	62.9	80
										2.4	—	—	65.3	80
										—	36	36.1	62.9	80
										2.4	36	36.1	65.3	80
										—	72*	72.3	104.9	150
										2.4	72*	72.3	104.9	150
										—	108††	108.4	150.0	150
								15†	15.4	—	—	—	66.7	80
										2.4	—	—	69.1	90
										—	36	36.1	66.7	90
										2.4	36	36.1	69.1	90
										—	72*	72.3	109.6	125
										2.4	72*	72.3	109.6	125
										—	108††	108.4	154.7	175

FLA — Full Load Amps
Hp — Nominal Horsepower
IFM — Evaporator (Indoor) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (for wire sizing)
MOCP — Maximum Overcurrent Protection
OFM — Condenser (Outdoor) Fan Motor
RLA — Rated Load Amps

*50DJ units only.
†Standard efficiency.
**High efficiency.
††50DW units only.

(208/230, 460 V Only)

Table 5 — Electrical Data — 50DK,DY024

NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OFM	IFM		POWER EXHAUST FAN MOTOR*	ELECTRIC HEAT		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Total FLA	Hp	FLA	FLA	kW	FLA	MCA	MOCP Fuse Only
208/230-3-60	187	254	43.3	228	31.5	160	6.4	5.0†	15.2	—	—	—	108.5/108.5	150/150
										6.6/6.0	—	—	115.1/114.5	150/150
										—	16/18	40.9/45.2	108.5/108.5	150/150
										6.6/6.0	16/18	40.9/45.2	115.1/114.5	150/150
										—	33/36	81.8/90.4	121.2/132.0	150/150
										6.6/6.0	33/36	81.8/90.4	121.2/132.0	150/150
								7.5†	22.0	—	—	—	115.3/115.3	150/150
										6.6/6.0	—	—	121.9/121.3	150/150
										—	16/18	40.9/45.2	115.3/115.3	150/150
										6.6/6.0	16/18	40.9/45.2	121.9/121.3	150/150
										—	33/36	81.8/90.4	129.8/140.5	150/175
										6.6/6.0	33/36	81.8/90.4	129.8/140.5	150/175
								5.0**	124	—	—	—	105.7/105.7	125/125
										6.6/6.0	—	—	112.3/111.7	150/150
										—	16/18	40.9/45.2	105.7/105.7	125/125
										6.6/6.0	16/18	40.9/45.2	112.3/111.7	150/150
										—	33/36	81.8/90.4	117.7/128.5	125/125
										6.6/6.0	33/36	81.8/90.4	117.7/128.5	150/150
								7.5**	19.6	—	—	—	112.9/112.9	150/150
										6.6/6.0	—	—	119.5/118.9	150/150
										—	16/18	40.9/45.2	112.9/112.9	150/150
										6.6/6.0	16/18	40.9/45.2	119.5/118.9	150/150
										—	33/36	81.8/90.4	126.7/137.5	150/150
										6.6/6.0	33/36	81.8/90.4	126.7/137.5	150/150
460-3-60	414	508	22.1	114	15.7	80	3.2	5.0†	7.2	—	—	—	53.7	70
										3.0	—	—	56.7	70
										—	18	22.6	53.7	70
										3.0	18	22.6	56.7	70
										—	36	45.2	65.5	70
										3.0	36	45.2	65.5	70
								7.5†	10.5	—	—	—	57.0	70
										3.0	—	—	60.0	80
										—	18	22.6	57.0	70
										3.0	18	22.6	60.0	80
										—	36	45.2	69.6	80
										3.0	36	45.2	69.6	80
								5.0**	6.2	—	—	—	52.7	70
										3.0	—	—	55.7	70
										—	18	22.6	52.7	70
										3.0	18	22.6	55.7	70
										—	36	45.2	64.2	70
										3.0	36	45.2	64.2	70
								7.5**	9.8	—	—	—	56.3	70
										3.0	—	—	59.3	80
										—	18	22.6	56.3	70
										3.0	18	22.6	59.3	80
										—	36	45.2	68.7	80
										3.0	36	45.2	68.7	80
575-3-60	518	632	17.9	91	12.6	64	4.8	5.0†	5.6	—	—	—	45.4	60
										2.4	—	—	47.8	60
										—	36	36.1	52.1	60
										2.4	36	36.1	52.1	60
								7.5†	8.6	—	—	—	48.4	60
										2.4	—	—	50.8	60
										—	36	36.1	55.9	70
										2.4	36	36.1	55.9	70

FLA — Full Load Amps
Hp — Nominal Horsepower
IFM — Evaporator (Indoor) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (for wire sizing)
MOCP — Maximum Overcurrent Protection
OFM — Condenser (Outdoor) Fan Motor
RLA — Rated Load Amps

*50DK units only.
†Standard efficiency.
**High efficiency.

(208/230, 460 V Only)

Table 6 — Electrical Data — 50DK,DY028

NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OFM	IFM		POWER EXHAUST FAN MOTOR*	ELECTRIC HEAT		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Total FLA	Hp	FLA	FLA	kW	FLA	MCA	MOCP Fuse Only
208/230-3-60	187	254	63.6	266	39.7	198	10.8	7.5†	22.0	—	—	—	152.0/152.0	200/200
										6.6/6.0	—	—	158.6/158.0	200/200
										—	16/18	40.9/45.2	152.0/152.0	200/200
										6.6/6.0	16/18	40.9/45.2	158.6/158.0	200/200
										—	33/36	81.8/90.4	152.0/152.0	200/200
										6.6/6.0	33/36	81.8/90.4	158.6/158.0	200/200
								10.0†	26.4	—	—	—	156.4/156.4	200/200
										6.6/6.0	—	—	163.0/162.4	225/225
										—	16/18	40.9/45.2	156.4/156.4	200/200
										6.6/6.0	16/18	40.9/45.2	163.0/162.4	225/225
										—	33/36	81.8/90.4	156.4/156.4	200/200
										6.6/6.0	33/36	81.8/90.4	163.0/162.4	225/225
								7.5**	19.6	—	—	—	149.6/149.6	200/200
										6.6/6.0	—	—	156.2/155.6	200/200
										—	16/18	40.9/45.2	149.6/149.6	200/200
										6.6/6.0	16/18	40.9/45.2	156.2/155.6	200/200
										—	33/36	81.8/90.4	149.6/149.6	200/200
										6.6/6.0	33/36	81.8/90.4	156.2/155.6	200/200
								10.0**	24.2	—	—	—	154.2/154.2	200/200
										6.6/6.0	—	—	160.8/160.2	200/200
										—	16/18	40.9/45.2	154.2/154.2	200/200
										6.6/6.0	16/18	40.9/45.2	160.8/160.2	200/200
										—	33/36	81.8/90.4	154.2/154.2	200/200
										6.6/6.0	33/36	81.8/90.4	160.8/160.2	200/200
460-3-60	414	508	28.6	120	19.9	99	5.4	7.5†	10.5	—	—	—	71.5	100
										3.0	—	—	74.5	100
										—	18	22.6	71.5	100
										3.0	18	22.6	74.5	100
										—	36	45.2	71.5	100
										3.0	36	45.2	74.5	100
								10.0†	12.5	—	—	—	73.5	100
										3.0	—	—	76.5	100
										—	18	22.6	73.5	100
										3.0	18	22.6	76.5	100
										—	36	45.2	73.5	100
										3.0	36	45.2	76.5	100
								7.5**	9.8	—	—	—	70.8	90
										3.0	—	—	73.8	100
										—	18	22.6	70.8	90
										3.0	18	22.6	73.8	100
										—	36	45.2	70.8	90
										3.0	36	45.2	73.8	100
								10.0**	12.2	—	—	—	73.2	100
										3.0	—	—	76.2	100
										—	18	22.6	73.2	100
										3.0	18	22.6	76.2	100
										—	36	45.2	76.2	100
										3.0	36	45.2	76.2	100
575-3-60	518	632	22.9	96	15.9	79	4.8	7.5†	8.6	—	—	—	57.9	80
										2.4	—	—	60.3	80
										—	36	36.1	57.9	80
										2.4	36	36.1	60.3	80
								10.0†	11.6	—	—	—	60.9	80
										2.4	—	—	63.3	80
										—	36	36.1	60.9	80
										2.4	36	36.1	63.3	80

FLA — Full Load Amps
Hp — Nominal Horsepower
IFM — Evaporator (Indoor) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (for wire sizing)
MOCP — Maximum Overcurrent Protection
OFM — Condenser (Outdoor) Fan Motor
RLA — Rated Load Amps

*50DK units only.
†Standard efficiency.
**High efficiency.

(208/230, 460 V Only)

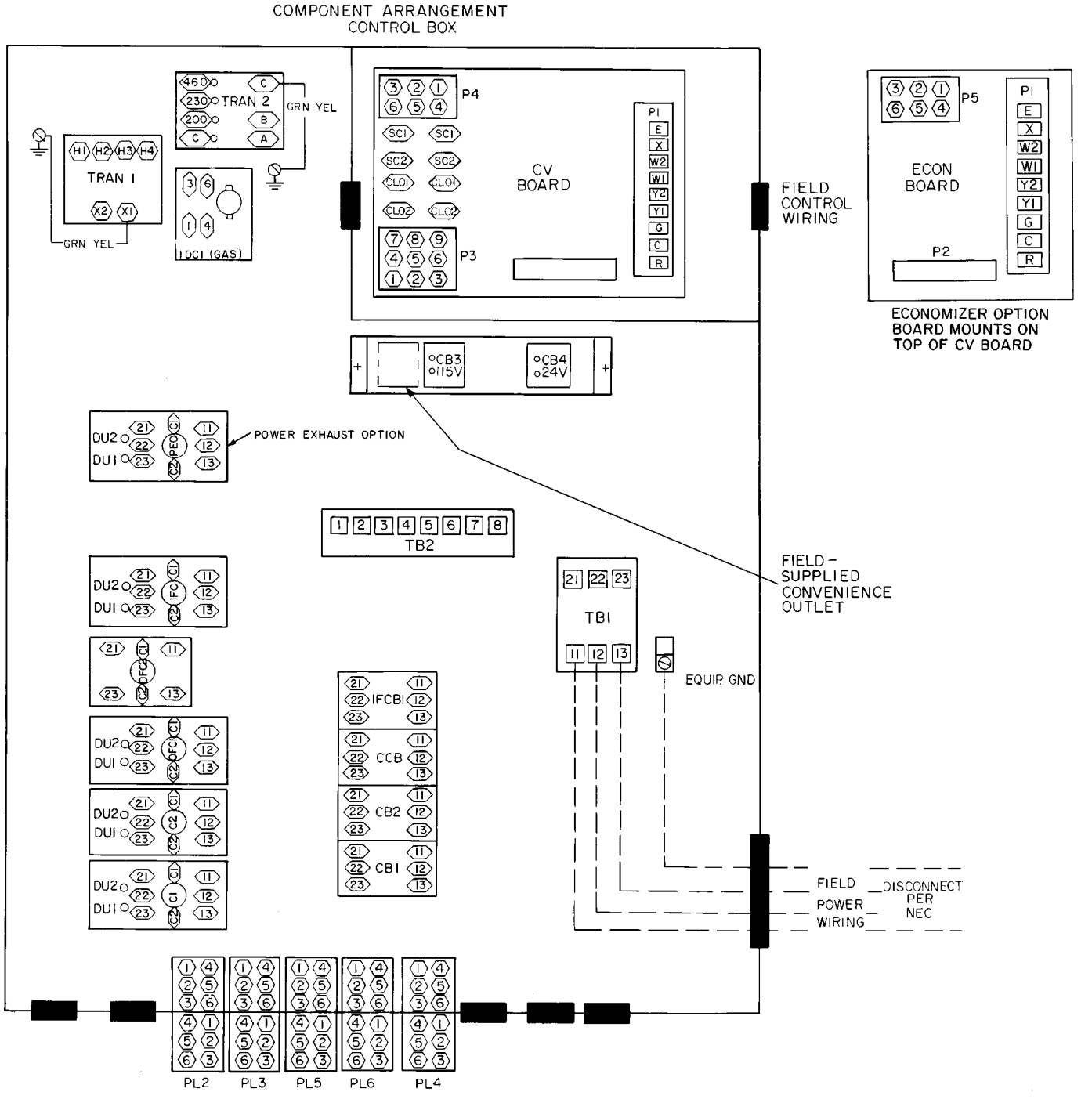
Table 7 — Electrical Data — 50DK,DY030

NOMINAL V-PH-HZ	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		OFM	IFM		POWER EXHAUST FAN MOTOR*	ELECTRIC HEAT		POWER SUPPLY	
	Min	Max	RLA	LRA	RLA	LRA	Total FLA	Hp	FLA	FLA	kW	FLA	MCA	MOCP Fuse Only
208/230-3-60	187	254	63.6	266	44.3	228	10.8	10.0†	26.4	—	—	—	161.0/161.0	200/200
										6.6/6.0	—	—	167.6/167.0	225/225
										—	16/18	40.9/45.2	161.0/161.0	200/200
										6.6/6.0	16/18	40.9/45.2	167.6/167.0	225/225
										—	33/36	81.8/90.4	161.0/161.0	200/200
										6.6/6.0	33/36	81.8/90.4	167.6/167.0	225/225
								15.0†	42.0	—	—	—	176.6/176.6	225/225
										6.6/6.0	—	—	183.2/182.6	225/225
										—	16/18	40.9/45.2	176.6/176.6	225/225
										6.6/6.0	16/18	40.9/45.2	183.2/182.6	225/225
										—	33/36	81.8/90.4	176.6/176.6	225/250
										6.6/6.0	33/36	81.8/90.4	183.2/182.6	225/250
								10.0**	24.2	—	—	—	158.8/158.8	200/200
										6.6/6.0	—	—	165.4/164.8	225/225
										—	16/18	40.9/45.2	158.8/158.8	200/200
										6.6/6.0	16/18	40.9/45.2	165.4/164.8	225/225
										—	33/36	81.8/90.4	158.8/158.8	200/200
										6.6/6.0	33/36	81.8/90.4	165.4/164.8	225/225
								15.0**	36.6	—	—	—	171.2/171.2	225/225
										6.6/6.0	—	—	177.8/177.2	225/225
										—	16/18	40.9/45.2	171.2/171.2	225/225
										6.6/6.0	16/18	40.9/45.2	177.8/177.2	225/225
										—	33/36	81.8/90.4	171.2/171.2	225/225
										6.6/6.0	33/36	81.8/90.4	177.8/177.2	225/225
460-3-60	414	508	30.0	120	22.1	114	5.4	10.0†	12.5	—	—	—	77.5	100
										3.0	—	—	80.5	110
										—	18	22.6	77.5	100
										3.0	18	22.6	80.5	110
										—	36	45.2	77.5	100
										3.0	36	45.2	80.5	110
								15.0†	20.0	—	—	—	85.0	110
										3.0	—	—	88.0	110
										—	18	22.6	85.0	110
										3.0	18	22.6	88.0	110
										—	36	45.2	85.0	125
										3.0	36	45.2	88.0	125
								10.0**	12.2	—	—	—	77.2	100
										3.0	—	—	80.2	110
										—	18	22.6	77.2	100
										3.0	18	22.6	80.2	110
										—	36	45.2	77.2	100
										3.0	36	45.2	80.2	110
								15.0**	18.3	—	—	—	83.3	110
										3.0	—	—	86.3	110
										—	18	22.6	83.3	110
										3.0	18	22.6	86.3	110
										—	36	45.2	83.3	110
										3.0	36	45.2	86.3	110
575-3-60	518	632	22.9	96	17.9	91	4.8	10†	11.6	—	—	—	62.9	80
										2.4	—	—	65.3	80
										—	36	36.1	62.9	80
										2.4	36	36.1	65.3	80
								15†	15.4	—	—	—	66.7	80
										2.4	—	—	69.1	90
										—	36	36.1	66.7	90
										2.4	36	36.1	69.1	90

FLA — Full Load Amps
Hp — Nominal Horsepower
IFM — Evaporator (Indoor) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (for wire sizing)
MOCP — Maximum Overcurrent Protection
OFM — Condenser (Outdoor) Fan Motor
RLA — Rated Load Amps

*50DK units only.
†Standard efficiency.
**High efficiency.

(208/230, 460 V Only)



LEGEND

C	— Compressor Contactor	**GND**	— Ground	**OFC**	— Condenser (Outdoor) Fan Motor Contactor
CB	— Circuit Breaker	**HR**	— Heat Relay	**P**	— Terminal Strip
CCB	— Control Circuit Breaker	**IFC**	— Evaporator (Indoor) Fan Motor Contactor	**PEC**	— Power Exhaust Contactor
CV	— Constant Volume	**IFCB**	— Evaporator (Indoor) Fan Motor Circuit Breaker	**PI**	— Plug
DU	— Dummy Terminal	**NEC**	— National Electrical Code	**TB**	— Terminal Block
ECON	— Economizer			**TRAN**	— Transformer
EQUIP	— Equipment				

Fig. 18 — Unit Control Box Component Arrangement — 50DJ,DW CV Units

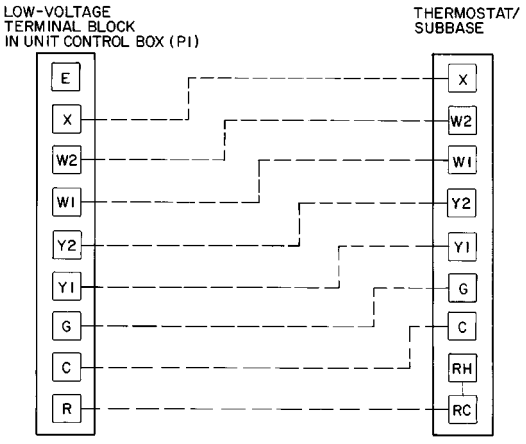
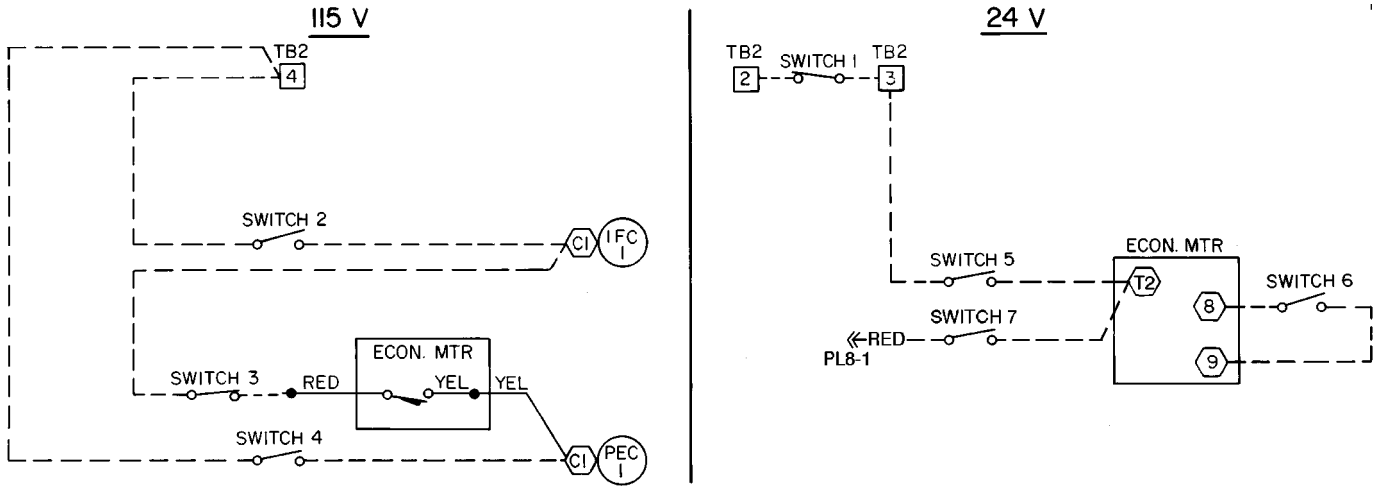


Fig. 19 — Field Control Thermostat Wiring, 50DJ,DW CV Units



Switch 1 — Firestat or smoke detector — normally closed.
Switch 2 — Building pressurization switch (energize evaporator-fan motor) — normally open.
Switch 3 — Switch to isolate evaporator-fan motor from power exhaust motor — normally closed.
Switch 4 — Smoke purge switch (energize power exhaust motor) — normally open.
Switch 5 — Switch to provide 24 v to economizer motor — normally open.
Switch 6 — Switch to drive economizer outdoor-air damper full open — normally open.
Switch 7 — Switch to isolate economizer motor from evaporator-fan motor or (CV board) — normally closed.

BUILDING PRESSURIZATION

Switch 1
Switch 2
Switch 3 (if unit equipped with power exhaust)
Switch 5
Switch 6

SMOKE PURGE

Switch 1
Switch 3
Switch 4
Switch 5
Switch 6
Switch 7

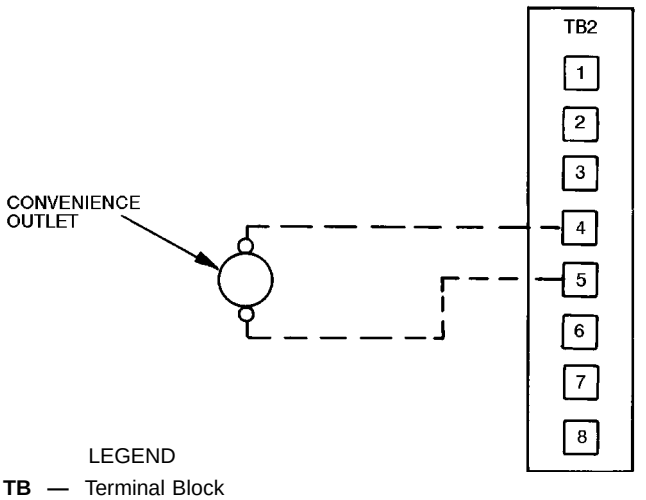
LEGEND

C — Contactor
ECON — Economizer
IFC — Indoor (Evaporator) Fan Contactor
MTR — Motor
PEC — Power Exhaust Contactor Coil
TB — Terminal Block

NOTES:

1. Power exhaust option available *only* on vertical supply-return units.
2. In order to install Switch 1, field must remove factory jumper between terminals 2 and 3 on terminal block 2.
3. - - - - is field wiring.
3. ——— is factory wiring.
5. All switches are field supplied.

Fig. 20 — Field Wiring for Building Pressurization and Smoke Purge — 50DJ,DW CV Units



LEGEND

TB — Terminal Block

NOTES:
1. Convenience outlet is field supplied and installed. Ground fault outlet should be used.
2. – – – – is field wiring.

Fig. 21 — 115-V Field Wiring, 50DJ,DW CV Units

CONTROL WIRING, VAV UNITS (DK,DY) — A switch or timeclock (field-supplied) must be wired in to control when unit will go into and out of occupied mode. Connect switch or timeclock between terminals 11 and 7 on terminal block 3 in unit control box (see Fig. 22 for the location of terminal block). See Fig. 23 and unit wiring schematic for wiring details.

Variable volume units equipped with warm-up heat require that room terminals be controlled to go fully open when unit goes into the heating mode. Heating interlock relays (HIR1 and 2) is provided for this function. The relay is located in the unit control box. When unit goes into heating mode, interlock relay is energized providing switch closure or opening (depending on how field power source is set up) to open the room terminals. Field connections for interlock relays are terminals 8 and 9 (for normally-open contacts) and terminals 8 and 15 (for normally-open contacts) on terminal block 2 (see Fig. 22). Note that a field-supplied power source is required. See Fig. 23 and unit wiring schematic for wiring details.

There are no required 115-v field wiring connections, therefore no provisions have been made in the unit for running 115-v wiring. If any of the field-installed options requiring 115-v connections are desired, the unit must be modified in the field for 115-v wiring. Options requiring 24-v or 115-v control wiring are listed below.

Building Pressurization or Smoke Purge Mode — Refer to Start-Up, Building Pressurization Mode and Smoke Purge Mode sections for additional information. See Fig. 24 and unit wiring label for wiring details.

24-V Connections:

1. Switch or switches to shut off power to unit in the event of a fire or smoke condition (field-supplied switch 2) — Wire field-supplied switch (smoke detector or firestat could be used) in series with the timeclock or occupied/unoccupied switch and wire a second switch or set of contacts in series with the night thermostat, if used.
2. Switch to open economizer outdoor-air damper during building pressurization and smoke purge (field-supplied switch 6) — Wire field-supplied switch between terminals 7 and 10 on terminal block 2.
3. Switch to provide 24-v power to inlet guide vane motor during building pressurization or smoke purge (field-supplied switch 8) — Wire field-supplied switch between terminals 1 and 2 on terminal block 3.
4. Switch to drive inlet guide vanes fully open during building pressurization (field-supplied switch 9) — Wire field-supplied switch between terminal C on the inlet guide vane differential pressure switch and the normally-closed terminal on the inlet guide vane differential pressure switch.
5. Switch to drive modulating power exhaust dampers to the fully open position during smoke purge (field-supplied switch 10) — Wire field-supplied switch between modulating power exhaust differential pressure switch terminal C and the normally closed terminal on the modulating power exhaust differential pressure switch. When this switch is manually closed, the modulating power exhaust damper will be driven to the fully open position.
6. Switch to drive room terminals fully open during smoke purge or building pressurization (field-supplied switches 11 and 11A). Wire normally-closed, field-supplied switch (switch 11) between terminal 15 on terminal block 2 and room terminals. Wire normally open field-supplied switch (switch 11A) between terminals 8 and 9 on terminal block 2. When switch 11 is opened and switch 11A is closed, the room terminals will be driven fully open.

115-V Connections:

1. Building pressurization switch (field-supplied switch 3) — Wire a field-supplied switch between terminals 13 and 15 on terminal block 3. (See Fig. 22 for the location of terminal block 3 in the unit control box).
2. Smoke purge switch (field-supplied switch 4) — Wire a field-supplied switch between terminals 15 and 3 on terminal block 3. (See Fig. 22 for the location of terminal block 3 in the unit control box).
3. Switch to isolate evaporator-fan motor from power exhaust motor during building pressurization or smoke purge (field-supplied switch 7) — Remove factory-installed jumper wire and wire a field-supplied switch between terminals 13 and 14 on terminal block 3. (See Fig. 22 for the location of terminal block 3 in the unit control box). It is necessary to remove the factory-installed jumper between terminals 12 and 14.

Accessory 2-Step Demand Limit — Install the 2-step demand limit module in unit control box as close as possible to the processor board. Mount using four no. 8 x ¾-in. long screws.

24-V Connection: The 2-step demand limit module is equipped with a connector for hookup to processor board. Prior to hookup, plugs and wires running between terminals 1, 2, and 3 on J3 of the processor board and terminals 1, 2, and 3 on terminal block 3 in unit control box must be removed. After removing these plugs, attach connector from demand limit module to terminals 1, 2, and 3 on processor board (see Fig. 25). The 115-v wiring for field-controlled input signals must be completed before demand limit board will operate.

115-V Connection: Field-controlled input signals to the accessory 2-step demand limit module. Connect field input signals to terminal strips INT1 and INT2 located on the module (see Fig. 25). These are pressure-type terminals. The terminals will accept up to 12-gage wire. See Fig. 26 for wiring details.

Convenience Outlet

115-V Connection: Convenience outlet can be mounted on panel containing control circuit breakers (CB3 and 4). See Fig. 22. Remove sheet metal cover that conceals 2⅝ in. x 1 7/16 in. hole and install outlet in hole. Wire between terminals 4 and 8 on terminal block 3 in the unit control box (see Fig. 27). The convenience outlet should be ground-fault protected.

(Text continued on page 30.)

LEGEND

C	—	Contactor, Compressor
CB	—	Circuit Breaker
CCB	—	Control Circuit Breaker
CH	—	Crankcase Heater
CO	—	Convenience Outlet
COMP	—	Compressor Motor
CR	—	Control Relay
CS	—	Centrifugal Switch
DPS	—	Differential Pressure Switch
DU	—	Dummy Terminal
EC	—	Enthalpy Control
ECON	—	Economizer
ECR	—	Economizer Closed Relay
EFM	—	Exhaust Fan Motor
EQUIP	—	Equipment
GND	—	Ground
HIR	—	Heat Interlock Relay
HPT	—	Head Pressure Thermostat
HPS	—	High-Pressure Switch
HT	—	Heater Thermostat
HTR	—	Heater
HV	—	High Voltage
IFC	—	Evaporator (Indoor) Fan Contactor
IFCB	—	Evaporator (Indoor) Fan Circuit Breaker
IFM	—	Evaporator (Indoor) Fan Motor
IGV	—	Inlet Guide Vanes
IP	—	Internal Protector
LPS	—	Low-Pressure Switch
LS	—	Limit Switch
MAT	—	Mixed-Air Thermostat
MGV	—	Main Gas Valve
MTR	—	Motor
OFC	—	Condenser (Outdoor) Fan Contactor
OFM	—	Condenser (Outdoor) Fan Motor
OMR	—	Occupied Motor Relay
P	—	Plug
PEC	—	Power Exhaust Contactor
PL	—	Plug Assembly
POT	—	Potentiometer
RES	—	Resistor
RS	—	Rollout Switch
SC	—	Safety Circuit
SEN	—	Sensor
SW	—	Switch
T	—	Thermistor
TB	—	Terminal Block
TRAN	—	Transformer
U	—	Compressor Unloader Solenoid
V	—	Voltage
VAV	—	Variable Air Volume

Terminal (Marked)

Terminal (Unmarked)

Terminal Block

Splice

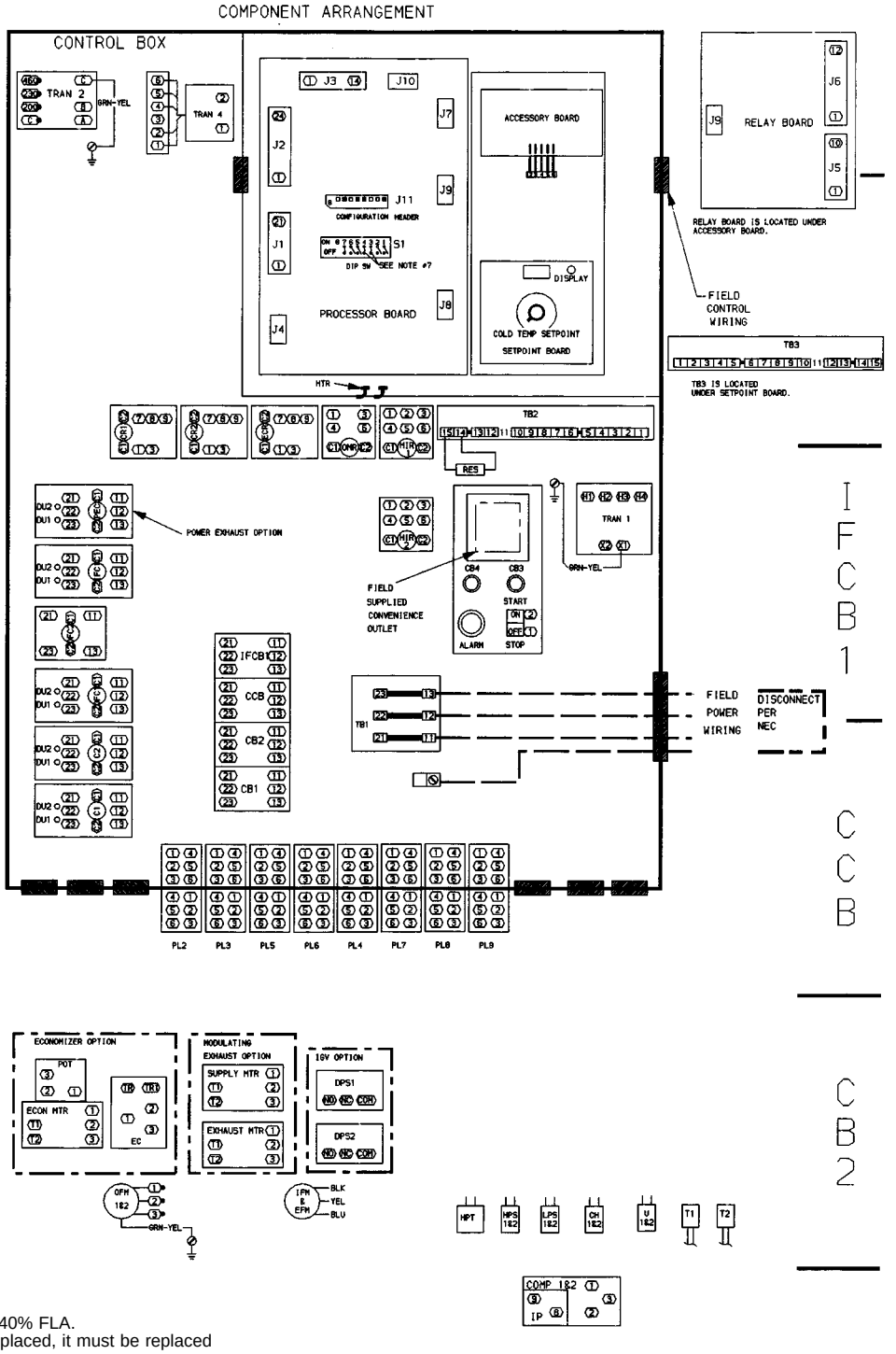
Splice (Marked)

Factory Wiring

Field Control Wiring

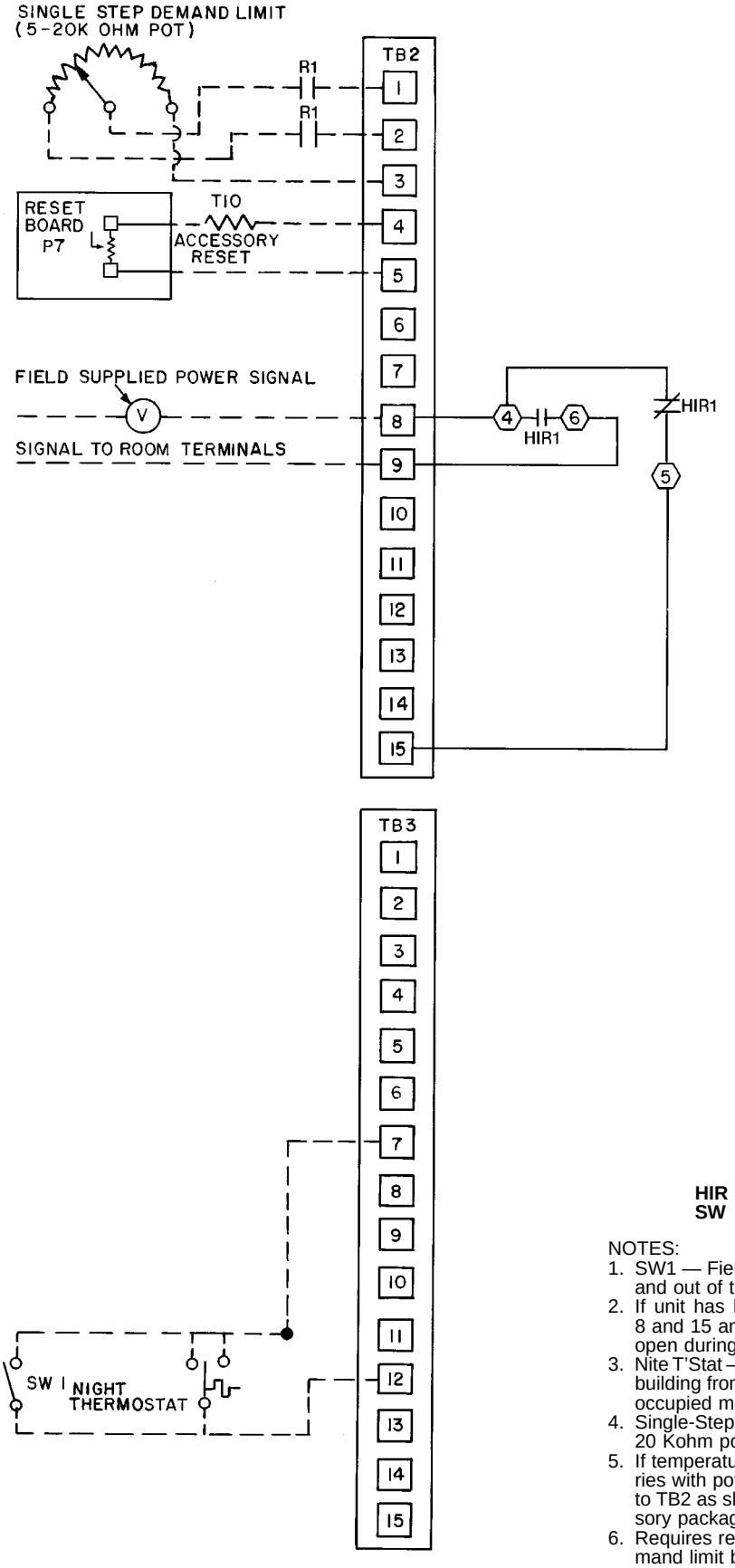
Field Power Wiring

To Indicate Common Potential Only; Not to Represent Wiring



NOTES:
1. CB must trip amps are equal to or less than 140% FLA.
2. If any of the original wire furnished must be replaced, it must be replaced with type 90° C wire or its equivalent.
3. Number(s) indicates the line location of contacts, a bracket over (2) numbers signifies single pole double throw contacts, an underlined number signifies a normally closed contact, plain numbers (no lines) signify a normally open contact. Line numbers 1-500 are located on power schematic, 501-800 are on 115 v control schematic, 801-900 on are on 24 v control schematic.
4. Condenser fan motors are thermally protected.
5. Three-phase motors are protected under primary single phasing conditions.
6. TRAN 1 and 2 are wired for 460 v on 460 v units and for 208 v for 208/230 v units. If 208/230 v units are to be run with 230 v power supply, the control circuit TRAN must be required as follows:
   Disconnect the BLU and YEL wires on TRAN 1 and connect to ⟨H3⟩. Also disconnect the BLU wire on TRAN 2 and connect to 230 v lead. TRAN 1 and 2 are wired for 230 v for 400 v units.
7. Switch no. 3 is shown on for economizer option only. Switch no. 4 is shown on for heat option only.

Fig. 22 — Unit Control Box Component Arrangement; 50DK,DY VAV Units

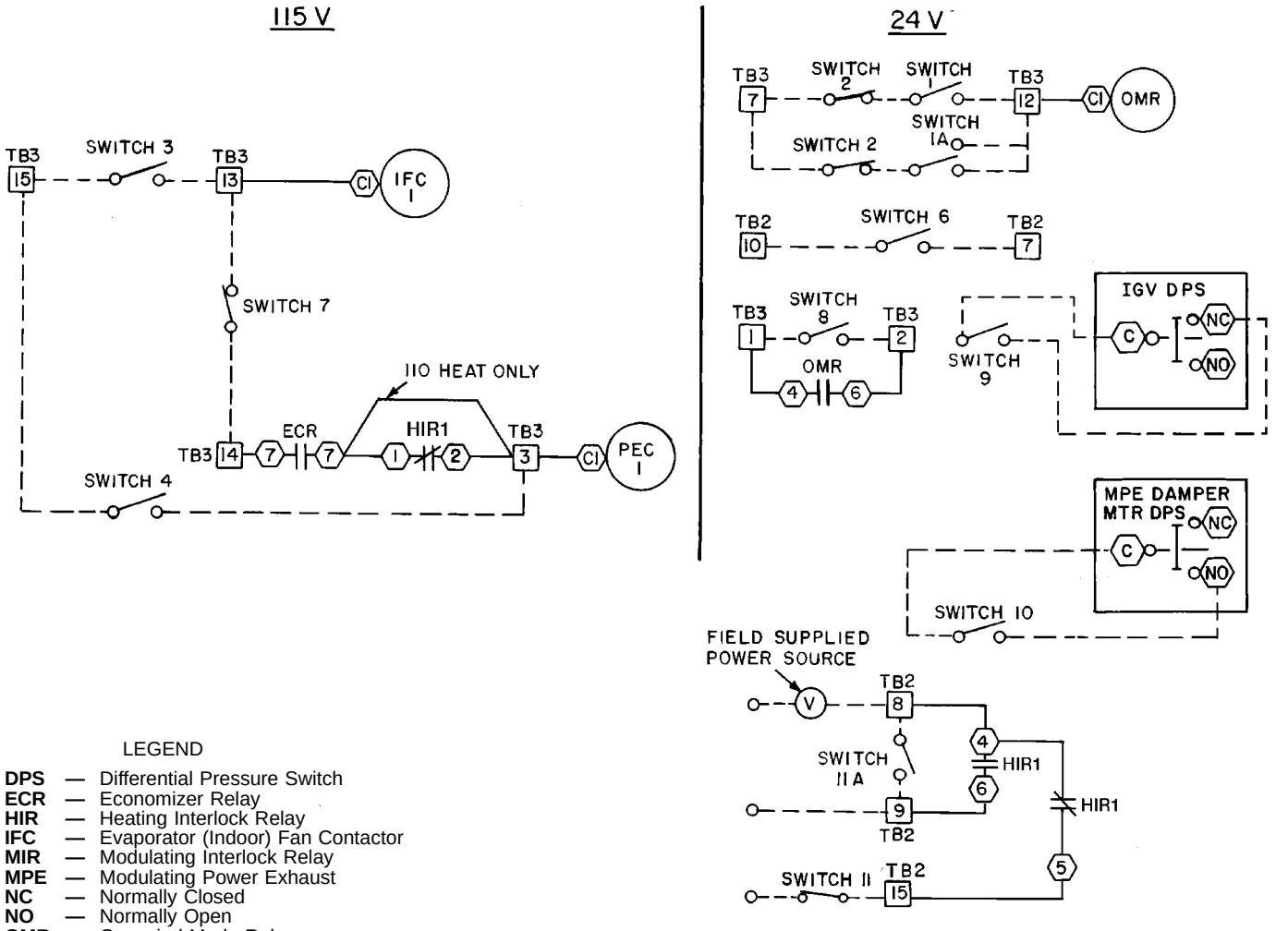


LEGEND

HIR — Heating Interlock Relay
SW — Switch

NOTES:
1. SW1 — Field-supplied switch (or timeclock) used to move unit in and out of the occupied mode.
2. If unit has heat, field must wire between terminals 8 and 9 or 8 and 15 and supply power source to drive room terminals wide open during heating.
3. Nite T'Stat — Field-supplied thermostat which can be used to keep building from becoming too hot or too cold when unit is in the unoccupied mode.
4. Single-Step Demand Limit consists of a field-supplied 5 to 20 Kohm potentiometer wired to TB2 as shown.
5. If temperature reset is used, thermistor T10 must be wired in series with potentiometer P7 (located on the reset board) and wire to TB2 as shown. T10 and the reset board are included in accessory package 50DJ900021.
6. Requires relay (R1) with 2 normally-open contacts to initiate demand limit by energizing R1 remotely.
7. ——— Factory Wiring
   - - - - Field Wiring

Fig. 23 — 24-V Field Wiring, 50DK,DY VAV Units



LEGEND

DPS — Differential Pressure Switch
ECR — Economizer Relay
HIR — Heating Interlock Relay
IFC — Evaporator (Indoor) Fan Contactor
MIR — Modulating Interlock Relay
MPE — Modulating Power Exhaust
NC — Normally Closed
NO — Normally Open
OMR — Occupied Mode Relay
PEC — Power Exhaust Contactor Coil
TB — Terminal Block

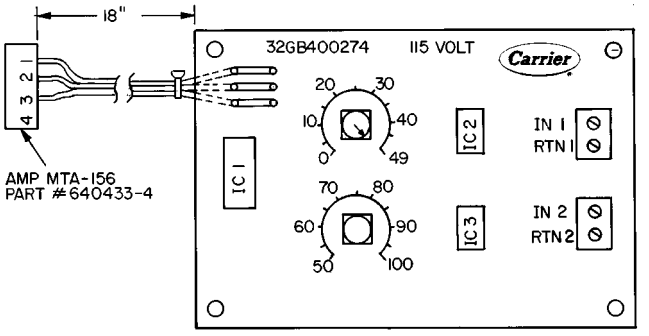
BUILDING PRESSURIZATION
Switch 2
Switch 3
Switch 6
Switch 7
Switch 8
Switch 9
Switch 11
Switch 11A

SMOKE PURGE
Switch 2
Switch 4
Switch 6
Switch 7
Switch 8
Switch 10
Switch 11
Switch 11A

Switch 1 and 1A — Field-supplied ON-OFF switch (timeclock) and night thermostat (see Note 1).
Switch 2 — Firestat or smoke detector — normally closed.
Switch 3 — Building pressurization switch (energize indoor fan motor) — normally open.
Switch 4 — Smoke purge switch (energize power exhaust motor) — normally open.
Switch 6 — Switch to drive economizer outdoor-air damper fully open — normally open.
Switch 7 — Switch to isolate evaporator-fan motor from power exhaust motor — normally closed.
Switch 8 — Switch to provide 24-v power to inlet guide vane motor and modulating power exhaust damper motor — normally open.
Switch 9 — Switch to drive inlet guide vanes fully open — normally open.
Switch 10 — Switch to drive modulating power exhaust dampers fully open — normally open.
Switch 11, 11A — Switch to energize field-supplied power source which drives room terminals fully open — normally open.

NOTES:
1. Switches 1 and 1A are for timeclock and night thermostat and are not part of building pressurization or smoke purge.
2. Power exhaust option available *only* on bottom supply-return units.
3. – – – – is field wiring.
4. ——— is factory wiring.
5. All switches are field supplied.
6. For building pressurization, field-supplied power source must drive room terminals wide open.

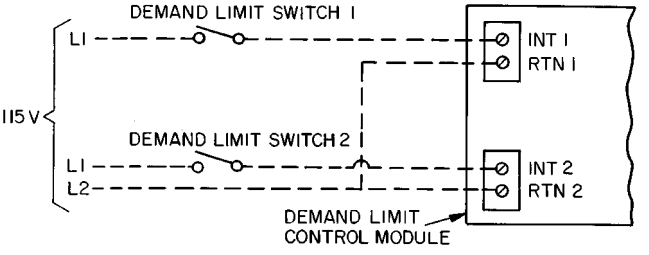
Fig. 24 — Field Wiring for Building Pressurization and Smoke Purge — 50DK,DY VAV Units



LEGEND

INT — Input
RTN — Return

Fig. 25 — Two-Step Demand Limit Module



NOTES:
1. Demand limit switches are field supplied and wired.
2. Demand limit control module terminal blocks will accept up to 12-gage wire.
3. - - - - is field wiring.

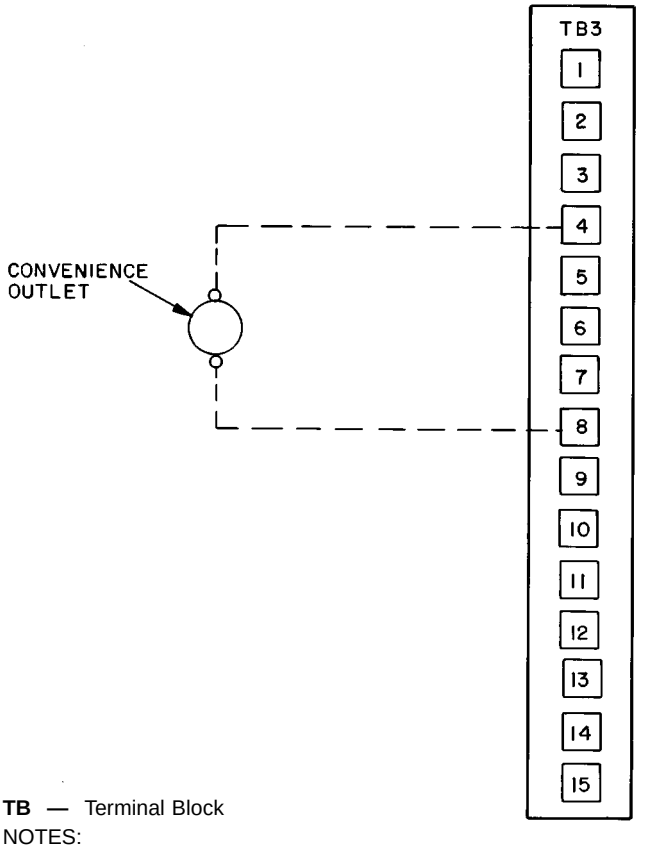
Fig. 26 — 115-V Field Wiring to Accessory 2-Step Demand Limit Control Module

The following options require 24-v connections. Refer to Fig. 22 for terminal block locations and to unit label diagrams for wiring details.

Timeclock Night Thermostat — Wire field-supplied thermostat between terminals 7 and 12 on terminal block 3. This thermostat is used to bypass the timeclock occupied-unoccupied switch and is used to operate unit during unoccupied times to keep building from becoming excessively hot or cold. (See Fig. 23 and 24.)

Space Temperature Reset Accessory (50DJ900021) — Consists of a reset board with a thermistor (T10) and a potentiometer (P7) that is used to set space temperature at which reset starts. Mount reset board in unit control box or other convenient place. Wire thermistor in series with P7 and connect to terminals 4 and 5 on terminal block 2 in unit control box. If there is a long run to conditioned space, splice additional wire to thermistor. The reset board has 2 pressure connectors for field wiring. (See Fig. 23.)

Single-Step Demand Limit Potentiometer — Potentiometer is a field-supplied, 3-wire potentiometer with a resistance of 5 and 20 Kohms. Connect 3 wires from potentiometer to terminals 1, 2, and 3 on terminal block in unit control box, as shown in Fig. 23.



TB — Terminal Block

NOTES:
1. Convenience outlet is field supplied. Ground fault outlet should be used.
2. - - - - is field wiring.

Fig. 27 — 115-V Field Wiring, 50DK,DY VAV Units

START-UP

Unit Preparation — Check to see that unit has been installed in accordance with these Installation Instructions and all applicable codes. Perform Start-Up Checklist items on page CL-1.

Compressor Mounting — Loosen compressor hold-down bolts until movement of the washer under each hold-down bolt head can be obtained. Do not loosen completely, as bolts are self-locking and will maintain adjustment.

Internal Wiring — Check all electrical connections in the unit control box; tighten as required.

Refrigerant Service Valves — All units have a Schrader-type service port on both suction lines. Be sure that caps on the ports are tight. All units have a discharge service valve on each compressor and a service valve on each liquid line. Be sure the valves are open before starting unit.

Crankcase Heaters — The crankcase heaters must be firmly locked into the compressors. The crankcase heaters are energized when there is power to the unit. *Crankcase heaters must be energized for at least 24 hours prior to unit start-up in order to remove liquid refrigerant from the compressor crankcase.*

Compressor Oil — Check that compressor oil is visible in the sight glass of the compressor. All units are factory charged with oil. See Table 8. Observe oil level closely at start-up. If oil level is below the sight glass and cannot be seen, add oil until the level is approximately ¼ of sight glass.

See Carrier Standard Service Techniques, Refrigerants section, for procedures to add or remove oil.

If oil charge is above sight glass, do not remove any oil until the compressor crankcase heater has been on for at least 24 hours. When additional oil or a complete charge is needed, use only Carrier-approved compressor oil.

Approved oils:

Witco Co. . . . . Suniso 3GS
Texaco, Inc. . . . . Capella WF-32

Do not use drained oil and do not use any oil that has been exposed to the atmosphere.

Table 8 — Oil Charge

UNIT 50DJ,DW,DK,DY	OIL CHARGE (Pints)
024	18 (8 for 06D818 and 10 for 06D328)
028,030	20 (10 per compressor)

Unit Voltage — Be sure power source agrees with the unit nameplate rating.

Leak Test and Dehydration — Be sure there are no refrigerant leaks. All units are shipped with a complete operating charge of R-22 (Tables 1A and 1B) and should be under sufficient pressure for leak testing after installation. For leak testing and dehydration procedures, see Carrier Standard Service Techniques, Refrigerants, Sections 6 and 7. Do not use the system compressors to reclaim the system charge.

Evaporator Fan, Belt, and Sheaves — Belts, pulley, and sheaves are factory installed. All pulleys are nonadjustable. Alternate drives must be field supplied. See Tables 9A and 9B.

See Tables 9A and 9B for complete listing of factory and field-supplied pulley and belt combinations. See Table 10 for air quantity limits. See Tables 11-14 to determine fan speed settings. See Table 15 for option and accessory component pressure drops.

Check the lubrication of fan and motor bearings. Bearings are shipped full of grease for corrosion protection and may run warm temporarily on start-up until the excess grease has discharged. Check bearing setscrews for tightness. Also check the tightness of the setscrews on the fan wheel and on the fan and motor sheaves. Check fan shaft bearing mountings for tightness.

Recheck sheave alignment and belt tension. See Adjustments section on page 47 for instructions.

Hand-turn the fan to make sure the fan wheel does not rub on the fan housing. The fan shaft and motor shaft must be freewheeling before power is applied to the unit.

Following the necessary electrical checks, check for fan vibration. If excessive vibration occurs, check for:

- drive misalignment
- mismatched belts
- wheel or sheaves loose on shaft
- loose bearings
- loose mounting bolts
- motor out of balance
- sheaves eccentric or out of balance
- wheel out of balance (replace if necessary)

Check rotation of wheel with arrow on the fan housing. Check fan speed with a strobe-type tachometer, or use this formula:

$$\text{Fan rpm} = \frac{\text{motor rpm x motor sheave pitch diameter (in.)}}{\text{fan sheave pitch diameter (in.)}}$$

(Obtain motor rpm from the fan motor nameplate and read sheave pitch diameters marked on the fan and motor sheaves.)

Example:

Nameplate motor rpm 1760
Motor sheave pitch diameter (in.) 6.4
Fan sheave pitch diameter (in.) 12.4

$$\text{Fan rpm} = \frac{1760 \times 6.4}{12.4} = 908 \text{ rpm}$$

The maximum allowable rpm is 1200.Excessive fan speed may result in condensate carryover from the evaporator coil, fan motor overload, or wheel failure.

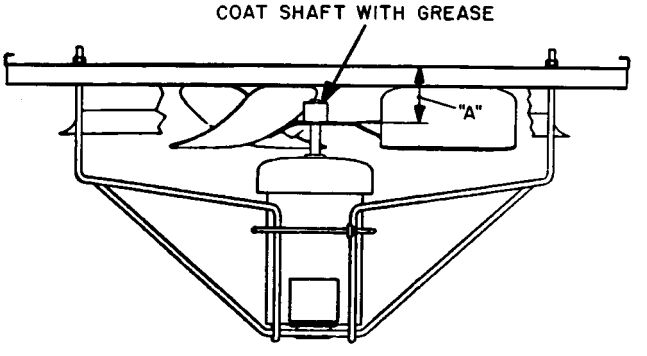
Condenser Fans and Motors — Each unit has 2 condenser fans and motors; these are factory set. See Fig. 28 for correct location of fan in orifice. Check that fan propeller rotation is correct; it should be counterclockwise when facing the fans.

Return-Air Filters — Check that the correct filters are installed in the filter rack. See Tables 1A and 1B for quantities and sizes. Access is through the door marked FILTER SECTION. Do not operate the unit without return-air filters.

Economizer Inlet Screens — Check that they are in place before operating the unit.

Economizer Dampers and Potentiometer Settings — With no power to the unit, the economizer outdoor-air dampers should be fully closed. Check by opening the access door marked FILTER SECTION.

On units with economizer, be sure MAT (CV units only) and economizer minimum positions are set at the desired settings. Be sure hood is installed properly.



UNIT 50DJ,DK,DW,DY	"A" DIMENSION (in.)
024	3.31
028	3.56
030	3.81

Fig. 28 — Condenser Fan Adjustment

Table 9A — Evaporator-Fan Pulley Data — Constant Volume Units (50DJ,DW) and Standard VAV Units (50DK,DY)

UNIT 50	FAN RPM	MOTOR PULLEY	BLOWER PULLEY	BELTS
		No. Grooves — Type — in.	No. Grooves — Type — in.	No. — Type — Size
JD,DK024	780*	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3V — 560
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3V — 560
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3V — 500
	980	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3V — 500
	1090	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3V — 500
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3V — 500
DW,DY024	780*	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3V — 850
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3V — 850
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3V — 800
	980	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3V — 800
	1090	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3V — 800
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3V — 800
DJ,DK028	680†	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3V — 560
	825	2 — 3V — 5.00	2 — 3V — 10.6	2 — 3V — 560
	900*	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3V — 500
	980	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3V — 500
	1090	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3V — 500
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3V — 500
DW,DY028	680†	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3V — 850
	825	2 — 3V — 5.00	2 — 3V — 10.6	2 — 3V — 850
	900*	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3V — 850
	980	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3V — 850
	1090	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3V — 850
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3V — 850
DJ,DK030	680†	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3V — 560
	825	2 — 3V — 5.00	2 — 3V — 10.6	2 — 3V — 560
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3V — 500
	980*	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3V — 500
	1090	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3V — 500
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3V — 500
DW,DY030	680†	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3V — 850
	825	2 — 3V — 5.00	2 — 3V — 10.6	2 — 3V — 850
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3V — 850
	980*	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3V — 850
	1090	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3V — 850
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3V — 850

*Indicates standard pulley combinations available as shown in Tables 1A and 1B. All other combinations are field supplied.
†Units with the high electric heat option cannot be run at this blower speed. The minimum speed with high electric heat option is 780 rpm.

Table 9B — Evaporator-Fan Pulley Data — VAV Units with Inlet Guide Vane and Static Pressure Control Option

UNIT 50	FAN RPM	MOTOR PULLEY	BLOWER PULLEY	BELTS
		No. Grooves — Type — in.	No. Grooves — Type — in.	No. — Type — Size
DK024	680	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3VX — 510
	785*	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3VX — 530
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3VX — 530
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3VX — 450
	985	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3VX — 450
	990	2 — 3V — 6.00	2 — 3V — 10.6	2 — 3VX — 530
	1075	2 — 3V — 6.50	2 — 3V — 10.6	2 — 3VX — 530
	1095	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3VX — 475
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3VX — 475
DY024	680	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3VX — 950
	785*	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3VX — 950
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3VX — 950
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3VX — 900
	985	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3VX — 900
	990	2 — 3V — 6.00	2 — 3V — 10.6	2 — 3VX — 1000
	1075	2 — 3V — 6.50	2 — 3V — 10.6	2 — 3VX — 1000
	1095	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3VX — 950
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3VX — 950
DK028	680	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3VX — 500
	785	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3VX — 500
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3VX — 500
	900*	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3VX — 450
	985	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3VX — 450
	990	2 — 3V — 6.00	2 — 3V — 10.6	2 — 3VX — 530
	1075	2 — 3V — 6.50	2 — 3V — 10.6	2 — 3VX — 530
	1095	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3VX — 475
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3VX — 475
DY028	680	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3VX — 950
	785	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3VX — 950
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3VX — 950
	900*	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3VX — 900
	985	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3VX — 900
	990	2 — 3V — 6.00	2 — 3V — 10.6	2 — 3VX — 1000
	1075	2 — 3V — 6.50	2 — 3V — 10.6	2 — 3VX — 1000
	1095	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3VX — 950
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3VX — 950
DK030	680	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3VX — 500
	785	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3VX — 500
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3VX — 500
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3VX — 450
	985*	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3VX — 450
	990	2 — 3V — 6.00	2 — 3V — 10.6	2 — 3VX — 530
	1075	2 — 3V — 6.50	2 — 3V — 10.6	2 — 3VX — 530
	1095	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3VX — 450
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3VX — 450
DY030	680	2 — 3V — 4.12	2 — 3V — 10.6	2 — 3VX — 950
	785	2 — 3V — 4.75	2 — 3V — 10.6	2 — 3VX — 950
	875	2 — 3V — 5.30	2 — 3V — 10.6	2 — 3VX — 950
	900	2 — 3V — 4.12	2 — 3V — 8.0	2 — 3VX — 900
	985*	2 — 3V — 4.50	2 — 3V — 8.0	2 — 3VX — 900
	990	2 — 3V — 6.00	2 — 3V — 10.6	2 — 3VX — 1000
	1075	2 — 3V — 6.50	2 — 3V — 10.6	2 — 3VX — 1000
	1095	3 — 3V — 5.00	3 — 3V — 8.0	3 — 3VX — 950
	1160	3 — 3V — 5.30	3 — 3V — 8.0	3 — 3VX — 950

*Indicates standard pulley combinations available as shown in Tables 1A and 1B. All other combinations are field supplied.

Table 10 — Air Quantity Limits (cfm)

UNIT		MINIMUM	MAXIMUM
50DJ,DW	024	6,000	10,000
	028	7,500	12,500
	030	8,100	12,500
50DK,DY	024	4,000	10,000
	028	5,000	12,500
	030	5,400	12,500

Table 11 — Fan Performance — 50DJ Units and 50DK Units Without Inlet Guide Vanes

UNIT 50DJ,DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024	6,000	570	1.8	620	2.2	660	2.4	690	2.6	730	2.9	770	3.3	820	3.6	850	3.8	880	4.0	920	4.3
	7,000	630	2.7	670	2.9	710	3.3	750	3.5	790	3.8	830	4.2	860	4.5	890	4.7	930	5.2	960	5.6
	8,000	690	3.8	730	4.2	770	4.5	800	4.7	830	5.0	860	5.5	900	5.7	930	6.2	960	6.6	1000	7.2
	9,000	760	5.2	800	5.4	830	5.8	860	6.2	890	6.5	930	7.0	960	7.6	990	8.1	1020	8.6	**1040**	**8.9**
	10,000	830	6.7	860	7.2	890	7.6	920	8.0	950	8.6	**980**	**9.1**	**1010**	**9.6**	**1040**	**10.1**	**1060**	**10.5**	**1090**	**10.8**

UNIT 50DJ,DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024 (cont)	6,000	950	4.7	980	5.2	1020	5.7	1050	5.9	1080	6.2	1110	6.7	1130	7.0	1150	7.3	1180	7.7	1200	8.0
	7,000	990	6.2	1030	6.6	1060	6.9	1080	7.2	1110	7.6	1140	8.0	1160	8.4	**1180**	**8.8**	—	—	—	—
	8,000	1030	7.6	1060	8.0	1080	8.3	**1120**	**8.7**	**1140**	**9.0**	**1170**	**9.5**	**1190**	**10.0**	—	—	—	—	—	—
	9,000	**1070**	**9.4**	**1100**	**9.7**	**1130**	**10.2**	**1160**	**10.6**	**1180**	**10.9**	**1200**	**11.3**	—	—	—	—	—	—	—	—
	10,000	**1120**	**11.1**	**1150**	**11.6**	**1170**	**12.0**	**1190**	**12.4**	—	—	—	—	—	—	—	—	—	—	—	—

UNIT 50DJ,DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030	7,000	550	2.3	590	2.5	630	2.8	670	3.0	710	3.3	750	3.5	800	3.9	830	4.3	870	4.6	900	4.9
	8,000	590	3.1	630	3.5	670	3.8	720	4.1	760	4.5	800	4.7	830	5.0	860	5.3	900	5.7	930	6.1
	9,000	640	4.4	690	4.6	730	4.9	770	5.2	810	5.6	840	5.9	870	6.2	900	6.6	940	7.2	970	7.8
	10,000	710	5.7	750	5.9	800	6.3	830	6.8	860	7.2	900	7.7	940	8.4	980	9.2	1010	9.6	1030	9.9
	11,000	770	7.0	820	7.5	850	8.0	880	8.6	910	9.0	940	9.6	970	10.0	1000	10.6	1030	11.1	1060	11.5
	12,000	850	9.2	870	9.5	910	10.4	940	10.9	960	11.2	**990**	**11.7**	**1020**	**12.2**	**1050**	**12.7**	**1070**	**13.2**	**1100**	**13.7**
	12,500	870	10.0	910	11.0	940	11.5	**960**	**11.9**	**980**	**12.3**	**1010**	**12.7**	**1040**	**13.2**	**1070**	**13.7**	**1100**	**14.5**	**1120**	**14.8**

UNIT 50DJ,DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6		3.8		4.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030 (cont)	7,000	930	5.2	970	5.7	1000	6.3	1030	6.7	1060	6.9	1080	7.2	1110	7.5	1140	7.9	1170	8.2	1190	8.8
	8,000	960	6.6	1000	7.2	1030	7.6	1060	8.0	1080	8.3	1110	8.6	1140	9.0	1170	9.5	1190	9.9	—	—
	9,000	1000	8.4	1030	8.7	1060	9.2	1090	9.5	1120	10.0	1140	10.3	1170	10.7	1190	11.1	—	—	—	—
	10,000	1060	10.2	1090	10.8	1120	11.1	1140	11.4	**1170**	**11.9**	**1190**	**12.4**	—	—	—	—	—	—	—	—
	11,000	**1080**	**12.0**	**1110**	**12.5**	**1130**	**12.8**	**1160**	**13.1**	**1180**	**13.6**	**1200**	**14.0**	—	—	—	—	—	—	—	—
	12,000	**1130**	**14.3**	**1160**	**14.8**	**1180**	**15.3**	**1200**	**15.6**	—	—	—	—	—	—	—	—	—	—	—	—
	12,500	**1150**	**15.4**	**1170**	**15.8**	**1200**	**16.5**	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Bhp — Brake Horsepower
Boldface — Special order motor required.
VAV — Variable Air Volume

NOTES:
1. Fan performance is based on wet coils, clean 2-in. filters and roof curb.
2. See Table 15 before using fan performance tables.
3. Conversion — Bhp to Watts

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{motor efficiency}}$$

See Tables 1A and 1B for motor efficiencies.

4. Minimum airflow shown is minimum recommended design cfm. Minimum airflow shown is minimum heating cfm for units equipped with electric heater.
5. VAV units can operate down to 70 cfm/nominal ton in cooling mode.

Table 12 — Fan Performance — 50DW Units and 50DY Units Without Inlet Guide Vanes

UNIT 50DW,DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024	6,000	570	1.9	620	2.1	670	2.5	710	2.8	760	3.1	790	3.3	830	3.6	870	3.9	910	4.3	940	4.6
	7,000	650	2.9	690	3.1	730	3.5	770	3.8	810	4.1	840	4.4	870	4.7	920	5.1	950	5.5	980	6.0
	8,000	720	4.1	760	4.4	790	4.7	830	5.0	860	5.3	900	5.7	930	6.1	960	6.5	990	7.0	1020	7.4
	9,000	800	5.4	830	5.8	870	6.2	900	6.7	930	7.2	960	7.6	990	8.1	1020	8.5	**1050**	**8.9**	**1080**	**9.4**
	10,000	870	7.2	900	7.7	930	8.3	**960**	**8.7**	**990**	**9.3**	**1020**	**9.7**	**1050**	**10.1**	**1080**	**10.5**	**1100**	**10.9**	**1130**	**11.4**

UNIT 50DW,DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024 (cont)	6,000	970	5.0	1010	5.5	1040	5.9	1070	6.2	1100	6.5	1130	7.0	1160	7.5	1190	7.9
	7,000	1020	6.5	1050	6.8	1080	7.2	1110	7.5	1140	8.0	1160	8.3	**1190**	**8.8**	—	—
	8,000	1060	7.9	1090	8.2	**1120**	**8.7**	**1150**	**9.2**	**1170**	**9.6**	**1200**	**10.1**	—	—	—	—
	9,000	**1110**	**9.8**	**1140**	**10.4**	**1170**	**10.7**	**1190**	**11.1**	—	—	—	—	—	—	—	—
	10,000	**1160**	**11.8**	**1180**	**12.1**	**1200**	**12.5**	—	—	—	—	—	—	—	—	—	—

UNIT 50DW,DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030	7,000	630	2.7	680	3.0	720	3.3	760	3.6	800	3.9	830	4.3	860	4.6	900	4.9	930	5.3	970	5.8
	8,000	670	3.7	720	4.0	760	4.3	790	4.6	820	4.9	860	5.3	900	5.7	930	6.2	960	6.7	1000	7.2
	9,000	740	5.0	780	5.2	810	5.5	840	6.0	880	6.4	920	6.9	950	7.5	980	8.1	1020	8.5	1040	8.9
	10,000	810	6.4	840	6.9	870	7.4	910	7.9	950	8.5	980	9.1	1010	9.6	1040	10.0	1070	10.5	1090	10.8
	11,000	870	8.4	910	9.1	940	9.5	970	10.0	1010	10.7	1040	11.2	**1070**	**11.6**	**1090**	**12.0**	**1120**	**12.4**	**1150**	**13.0**
	12,000	950	11.0	**980**	**11.6**	**1010**	**12.1**	**1040**	**12.6**	**1070**	**13.2**	**1090**	**13.6**	**1120**	**14.0**	**1150**	**14.6**	**1170**	**15.0**	**1200**	**15.5**
	12,500	**980**	**12.2**	**1020**	**12.9**	**1040**	**13.3**	**1070**	**13.9**	**1090**	**14.4**	**1120**	**14.8**	**1140**	**15.2**	**1170**	**15.7**	**1190**	**16.2**	—	—

UNIT 50DW,DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030 (cont)	7,000	1000	6.3	1030	6.7	1060	7.0	1090	7.3	1120	7.6	1140	8.0	1170	8.4	1190	8.8
	8,000	1030	7.7	1060	8.1	1090	8.4	1120	8.7	1140	9.1	1160	9.5	1190	10.0	—	—
	9,000	1070	9.3	1100	9.6	1130	10.2	1160	10.6	1180	11.0	1200	11.3	—	—	—	—
	10,000	1120	11.1	1150	11.5	**1170**	**12.0**	**1200**	**12.5**	—	—	—	—	—	—	—	—
	11,000	**1170**	**13.3**	**1200**	**13.9**	—	—	—	—	—	—	—	—	—	—	—	—
	12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 13 — Fan Performance — 50DK Units with Inlet Guide Vanes

UNIT 50DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024	6,000	640	2.6	680	2.9	730	3.3	770	3.7	810	4.1	840	4.4	870	4.7	910	5.0	940	5.3	970	5.6
	7,000	710	3.8	750	4.1	790	4.5	820	4.8	860	5.1	890	5.4	930	5.9	960	6.4	990	6.9	1020	7.3
	8,000	770	5.0	810	5.5	840	5.8	870	6.1	910	6.6	940	7.0	970	7.5	1000	8.0	1030	8.5	**1060**	**8.9**
	9,000	850	6.7	880	7.0	910	7.5	940	8.0	970	8.5	**1000**	**9.0**	**1030**	**9.5**	**1060**	**9.9**	**1090**	**10.3**	**1120**	**10.7**
	10,000	**920**	**8.7**	**960**	**9.4**	**990**	**10.1**	**1020**	**10.6**	**1040**	**11.0**	**1070**	**11.4**	**1090**	**11.7**	**1120**	**12.1**	**1140**	**12.5**	**1170**	**13.0**

UNIT 50DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRSSURE (in. wg)															
		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024 (cont)	6,000	1010	6.0	1040	6.5	1070	7.0	1090	7.3	1120	7.6	1150	8.1	1170	8.4	1200	8.8
	7,000	1050	7.6	1080	8.0	1110	8.5	**1140**	**9.0**	**1160**	**9.4**	**1190**	**9.8**	—	—	—	—
	8,000	**1090**	**9.3**	**1120**	**9.7**	**1150**	**10.1**	**1170**	**10.6**	**1200**	**11.1**	—	—	—	—	—	—
	9,000	**1150**	**11.2**	**1170**	**11.7**	**1200**	**12.3**	—	—	—	—	—	—	—	—	—	—
	10,000	**1200**	**13.5**	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Bhp — Brake Horsepower

Table 13 — Fan Performance — 50DK Units with Inlet Guide Vanes (cont)

UNIT 50DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030	7,000	630	3.2	660	3.4	700	3.6	740	4.0	780	4.4	830	4.8	860	5.2	890	5.5	920	5.8	960	6.4
	8,000	690	4.3	730	4.7	770	5.0	810	5.5	850	5.9	880	6.3	920	6.7	950	7.2	980	7.9	1010	8.3
	9,000	750	5.7	790	6.0	830	6.4	860	6.8	900	7.3	930	7.9	960	8.3	**990**	**8.8**	**1020**	**9.3**	**1050**	**9.7**
	10,000	830	7.3	860	7.8	890	8.3	**920**	**8.8**	**950**	**9.3**	**980**	**9.9**	**1010**	**10.5**	**1040**	**10.9**	**1070**	**11.3**	**1100**	**11.7**
	11,000	**900**	**9.7**	**930**	**10.2**	**960**	**10.8**	**990**	**11.4**	**1010**	**11.8**	**1040**	**12.3**	**1070**	**12.8**	**1100**	**13.3**	**1120**	**13.7**	**1150**	**14.2**
	12,000	**960**	**12.1**	**990**	**12.7**	**1020**	**13.3**	**1050**	**14.0**	**1080**	**14.6**	**1100**	**15.0**	**1130**	**15.5**	**1160**	**16.0**	**1180**	**16.6**	**1200**	**17.0**
	12,500	**990**	**13.4**	**1020**	**13.9**	**1050**	**14.6**	**1070**	**15.2**	**1100**	**15.7**	**1130**	**16.2**	**1160**	**16.9**	—	—	—	—	—	—

UNIT 50DK	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
		2.2		2.4		2.6		2.8		3.0		3.2		3.4		3.6	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030 (cont)	7,000	990	6.9	1020	7.3	1050	7.6	1080	8.0	1100	8.3	**1130**	**8.7**	**1160**	**9.2**	**1190**	**9.7**
	8,000	**1040**	**8.6**	**1070**	**9.0**	**1100**	**9.4**	**1120**	**9.7**	**1140**	**10.0**	**1160**	**10.3**	**1190**	**10.9**	—	—
	9,000	**1070**	**10.0**	**1100**	**10.4**	**1130**	**10.9**	**1150**	**11.3**	**1180**	**11.9**	**1200**	**12.3**	—	—	—	—
	10,000	**1130**	**12.3**	**1160**	**12.8**	**1180**	**13.4**	**1200**	**13.7**	—	—	—	—	—	—	—	—
	11,000	**1170**	**14.8**	**1200**	**15.3**	—	—	—	—	—	—	—	—	—	—	—	—
	12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 14 — Fan Performance — 50DY Units with Inlet Guide Vanes

UNIT 50DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024	6,000	620	2.5	670	2.9	710	3.2	750	3.5	790	3.8	830	4.2	870	4.6	900	4.9	940	5.3	970	5.7
	7,000	700	3.7	740	4.0	780	4.4	810	4.8	850	5.1	890	5.4	920	5.7	950	6.2	990	6.7	1020	7.2
	8,000	780	5.2	810	5.6	850	5.9	880	6.3	910	6.6	950	7.1	980	7.7	1010	8.2	1040	8.5	**1070**	**8.9**
	9,000	860	6.7	900	7.3	930	7.9	960	8.3	**990**	**8.8**	**1020**	**9.3**	**1050**	**9.7**	**1080**	**10.2**	**1110**	**10.6**	**1130**	**11.0**
	10,000	**940**	**9.2**	**970**	**9.6**	**1000**	**10.2**	**1030**	**10.8**	**1060**	**11.2**	**1090**	**11.6**	**1120**	**12.2**	**1140**	**12.6**	**1160**	**13.0**	**1190**	**13.4**

UNIT 50DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
		2.2		2.4		2.6		2.8		3.0		3.2		3.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
024 (cont)	6,000	1010	6.2	1040	6.6	1070	7.0	1000	7.4	1130	7.8	1160	8.3	**1190**	**8.8**
	7,000	1050	7.6	1080	8.0	1110	8.5	**1140**	**8.9**	**1170**	**9.5**	**1200**	**10.0**	—	—
	8,000	**1100**	**9.3**	**1130**	**9.8**	**1160**	**10.2**	**1190**	**10.8**	—	—	—	—	—	—
	9,000	**1160**	**11.5**	**1190**	**12.0**	—	—	—	—	—	—	—	—	—	—
	10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—

UNIT 50DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030	7,000	660	3.5	700	3.8	740	4.1	780	4.4	810	4.7	840	5.0	880	5.3	910	5.7	940	6.1	970	6.6
	8,000	740	4.7	780	5.2	820	5.6	860	5.9	890	6.3	920	6.7	950	7.2	980	7.7	1010	8.2	1040	8.6
	9,000	820	6.3	850	6.7	880	7.1	910	7.5	940	8.0	980	8.6	1010	9.2	1040	9.6	1070	10.0	1100	10.4
	10,000	900	8.5	930	9.0	960	9.5	990	10.1	1020	10.6	1050	11.0	**1180**	**11.5**	**1110**	**12.0**	**1130**	**12.4**	**1160**	**12.8**
	11,000	970	11.1	**1000**	**11.6**	**1030**	**12.0**	**1060**	**12.5**	**1090**	**13.1**	**1120**	**13.6**	**1140**	**14.2**	**1170**	**14.7**	**1200**	**15.3**	—	—
	12,000	**1050**	**13.9**	**1080**	**14.5**	**1100**	**14.9**	**1130**	**15.6**	**1160**	**16.1**	**1180**	**16.5**	**1200**	**17.0**	—	—	—	—	—	—
	12,500	**1070**	**14.8**	**1100**	**15.7**	**1130**	**16.5**	**1160**	**16.9**	—	—	—	—	—	—	—	—	—	—	—	—

UNIT 50DY	AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)													
		2.2		2.4		2.6		2.8		3.0		3.2		3.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
028,030 (cont)	7,000	1000	7.0	1030	7.4	1060	7.8	1100	8.3	**1130**	**8.8**	**1160**	**9.3**	**1190**	**9.8**
	8,000	1070	8.9	1100	9.3	1130	9.8	**1160**	**10.2**	**1180**	**10.7**	**1200**	**11.2**	—	—
	9,000	1130	11.0	1150	11.4	**1170**	**11.8**	**1200**	**12.3**	—	—	—	—	—	—
	10,000	**1190**	**13.5**	—	—	—	—	—	—	—	—	—	—	—	—
	11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	12,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	12,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Bhp — Brake Horsepower
Boldface — Special order motor required.
VAV — Variable Air Volume

NOTES:
1. Fan performance is based on wet coils, clean 2-in. filters and roof curb.
2. See Table 15 before using fan performance tables.
3. Conversion — Bhp to Watts

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{motor efficiency}}$$

See Tables 1A and 1B for motor efficiencies.

4. Minimum airflow shown is minimum recommended design cfm. Minimum airflow shown is minimum heating cfm for units equipped with electric heater.
5. VAV units can operate down to 70 cfm/nominal ton in cooling mode.

Table 15 — Component Pressure Drops (in. wg)

COMPONENT	CFM						
	6000	7000	8000	9000	10,000	11,000	12,000
ECONOMIZER							
All Units	0.18	0.20	0.25	0.28	0.32	0.36	0.40
LOW ELECTRIC HEAT							
208/230 and 460 V							
50DJ,DK	0.03	0.11	0.15	0.16	0.18	0.18	0.19
50DW,DY	0.03	0.10	0.14	0.14	0.15	0.17	0.20
MED ELECTRIC HEAT							
208/230, 460 and 575 V							
50DJ,DK	0.20	0.24	0.29	0.35	0.41	0.48	0.56
50DW,DY	0.09	0.13	0.14	0.16	0.21	0.25	0.30
HIGH ELECTRIC HEAT							
208/230 V							
50DJ	0.28	0.33	0.39	0.47	0.58	0.68	0.80
50DW	0.12	0.16	0.18	0.20	0.23	0.30	0.32
460 and 575 V							
50DJ	0.26	0.33	0.41	0.49	0.58	0.68	0.80
50DW024	0.11	0.16	0.19	0.21	0.23	0.30	0.32
50DW028,030	0.11	0.16	0.19	0.24	0.26	0.35	0.40

25% Outdoor-Air Damper — On units without economizer, be sure 25% outdoor-air damper is set at the desired position. Also, be sure hood is installed properly.

Switch and Potentiometer Settings, VAV Units Only — On 50DK,DY units, be sure that all dip switches are in the proper position. The dip switches are located on the processor board (see Fig. 29). The 8 switches should be in following positions:

Switch 1 — OFF
Switch 2 — OFF if accessory reset is not used; ON if accessory reset is used
Switch 3 — OFF if unit does not have economizer option; ON if unit has economizer option
Switch 4 — OFF if unit has no electric heat; ON if unit has electric heat option
Switch 5 — OFF if accessory demand limit is not used; ON if accessory demand limit is used
Switch 6 — OFF
Switch 7 — ON
Switch 8 — OFF

Jumpers on configuration header (also located on processor board) are broken as necessary at the factory. The 8 jumpers should be set as described below. (See Table 16 for a complete description of each jumper.)

Jumper 1 — Broken
Jumper 2 — Unbroken
Jumper 3 — Unbroken
Jumper 4 — Broken
Jumper 5 — Broken
Jumper 6 — Unbroken
Jumper 7 — Broken
Jumper 8 — Unbroken

As previously described, VAV units have 7 potentiometers. They must all be properly set before unit is started. Each has a valid range and a range that is used by the control. The valid range is the range of potentiometer resistance that the control will not consider to be an error; this is always 10% to 90% of total resistance. The control has also been programmed to use only a certain range for each of the potentiometers — it is not always the same range as the valid range. If a potentiometer is in valid resistance range, but out of the range the control has been programmed to use, the control will use a default value but will not energize alarm light or initiate an alarm code on the display. If potentiometer setting is out of valid range, the control will energize alarm light, an error code will appear on the display when display button is pushed and control will use a default value. Since only 10% to 90% of potentiometer resistance is used, turning knob fully clockwise or counterclockwise will always result in an error reading by the control. Following is a description of each of the potentiometers and their allowable range and range used by the control:

P1 (Leaving-Air Set Point) — The control uses an allowable range of 45 to 70 F. However, the potentiometer has a valid range of −22 to 70 F. If the set point is between −22 and 45 F, control will use a value of 45 F and alarm light will not be energized. If set point is outside valid range of the potentiometer (less than −22 F and greater than 70 F), alarm light will be energized, an error code of 82 will appear on the display when display button is pushed, and a default value of 70 will be used as the set point. This potentiometer is located on display board (see Fig. 30).

P2 (Economizer Position Feedback) — The valid range is 0 to 100%. (This is also the range the control has been programmed to accept.) This potentiometer is mounted on the economizer motor and indicates the economizer motor angular travel. No field adjustment should be necessary. The microprocessor has been programmed to indicate an error if travel during initialization mode is less than 10% of total potentiometer range 83; this will occur if dampers are stuck for some reason. An error will also be indicated as a faulty potentiometer if potentiometer fails during operation.

P3 (Reset Limit — Usable only if accessory reset is used. If accessory reset is used, dip switch 2 must be in the ON position. P3 should be set at the number of degrees of reset selected (difference between design leaving-air temperature and desired reset temperature). The valid range is 0° to 80 F. If potentiometer is out of valid range (less than 0° F or greater than 80 F), control will energize the alarm light, a code of 84 will appear on the display if display button is pushed, and reset will be terminated. The reset potentiometer is located on accessory board in unit control box (Fig. 31).

Table 16 — Configuration Header Jumper Description

JUMPER NO.	FUNCTION	SETTING	MEANING
1,2	Unit Type	□ ■	VAV Rooftop
3,4,5	No. of Compressors	■ □ □ □ ■ □ ■ ■ □	2 compressors 3 compressors 4 compressors
6	Expansion Valve	■	TXV
7	Power Frequency	□ ■	60 Hz 50 Hz
8	Not Used	■	No Significance

LEGEND

TXV — Thermostatic Expansion Valve
VAV — Variable Air Volume
□ — Broken jumper (open circuit)
■ — Unbroken jumper (closed circuit)

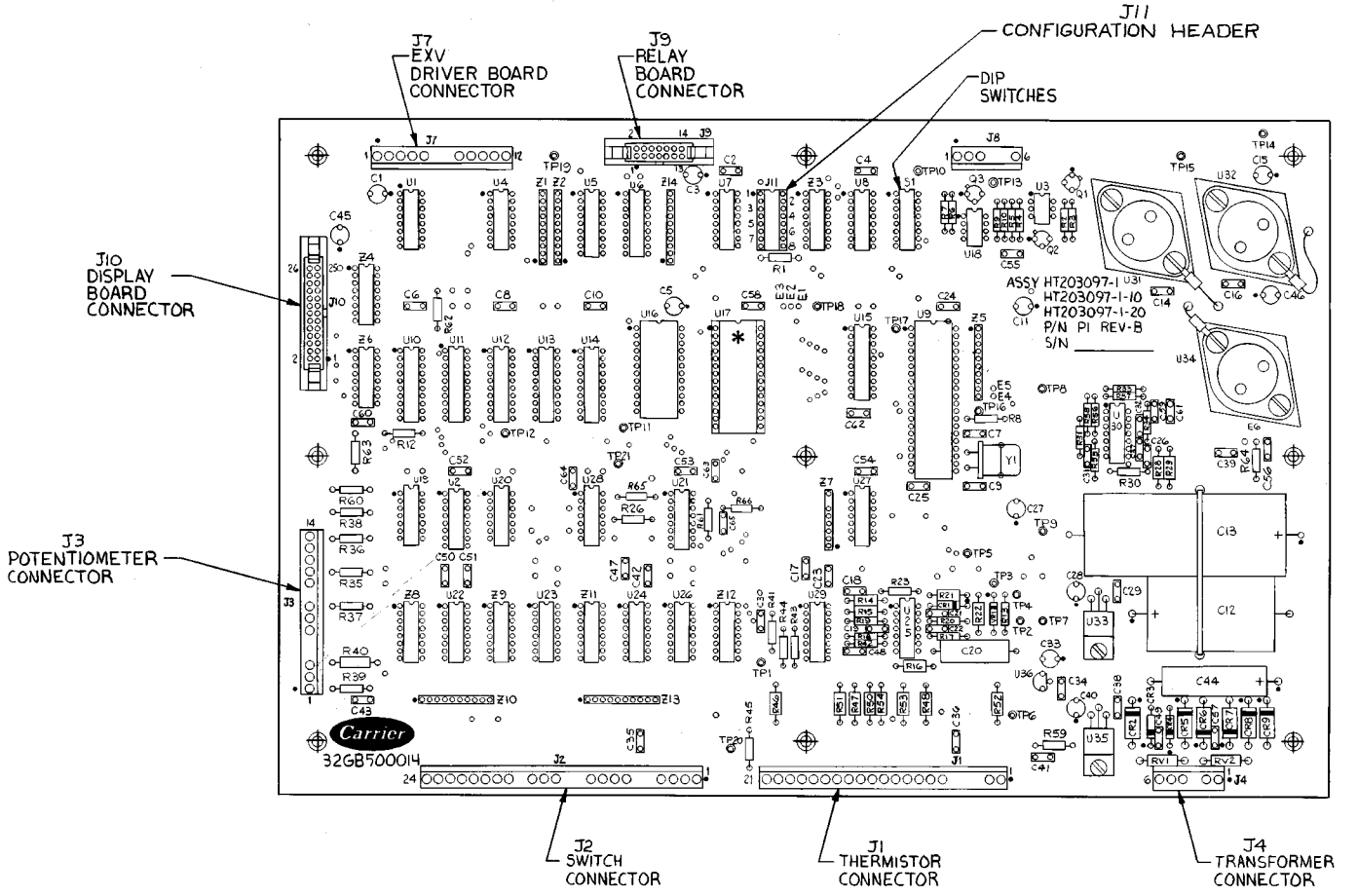


Fig. 29 — Processor Board

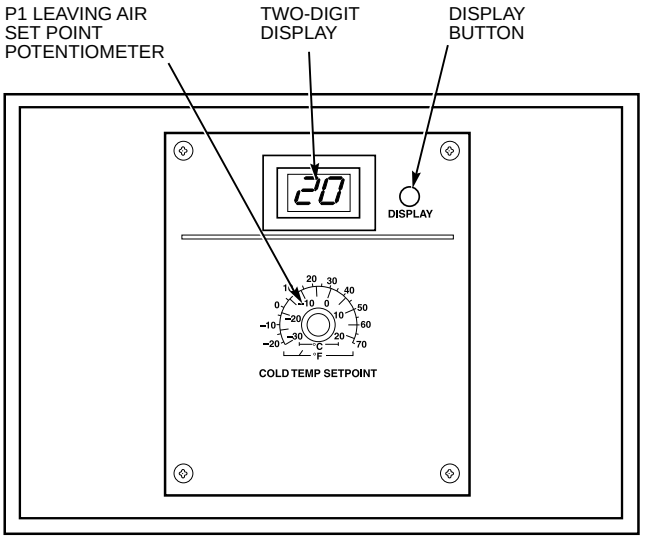


Fig. 30 — Display/Set Point Board

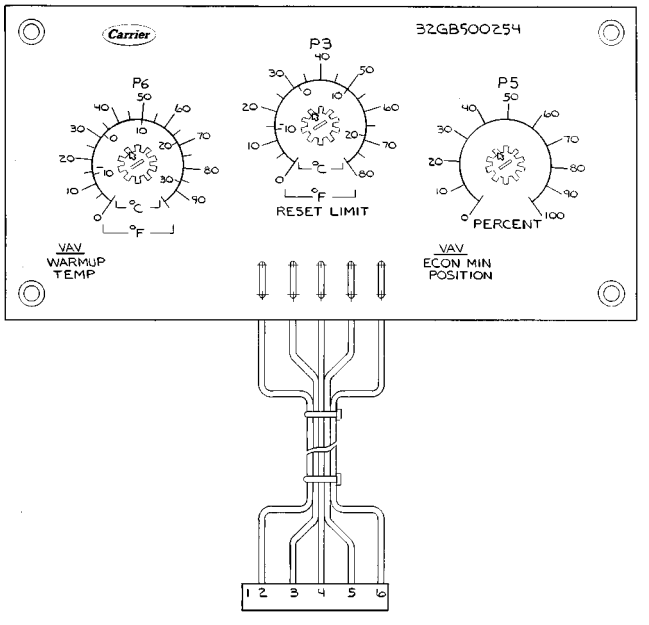


Fig. 31 — Accessory Reset Board

P4 (Demand Limit) — Usable only if demand limit is used. If demand limit is used, dip switch 5 must be in the ON position. The valid range is 0 to 100% (this is also range used by control). If potentiometer is out of this valid range, demand limit will be terminated, alarm light will energized and an error code of 85 will appear on display when display button is pushed. This potentiometer is mounted on accessory 2-step demand limit module (actually 2 potentiometers) if this accessory is used, or is located elsewhere if a field-supplied potentiometer is used for single-step demand limit.

P5 (Minimum Economizer Position) — Valid range is 0 to 100% (this is also the range control is programmed to use). Dip switch 3 must be in ON position. If set point is outside valid range, alarm light will be energized, an error code of 86 will be on display and economizer outdoor-air dampers will close. This potentiometer is located on accessory reset board (Fig. 31).

P6 (Warm-Up Potentiometer) — Used only if warm-up heat is used (units with optional electric heat). Dip switch 4 must be in ON position. The valid range is 0° F to 95 F. The control has been programmed to use a range of 40 F to 80 F. If the set point is between 0° F and 40 F, control will use a value of 40 F and no error will be indicated. If set point is between 80 F and 95 F, control will use a value of 80 F and again no error will be indicated. If set point is less than 0° F or greater than 95 F, alarm light will be energized, an error code of 87 will show on display when display button is pushed and control will use a default value of 40 F. This potentiometer is located on the accessory reset board (Fig. 31).

P7 (Reset Temperature) — Used only if space temperature reset is used. P7 is located on the reset board which is part of accessory package 50DJ900021. Dip switch 2 must be in ON position. Valid range is 0° to 90 F. P7 is used in conjunction with thermistor T10 and potentiometer P3 to provide space temperature reset. P7 is used to set space temperature at which reset will start.

It should be noted that there are other types of errors that can cause the alarm light to be energized and an error code to be shown on the display; the above errors only describe what happens if potentiometer set points are out of the valid range.

Quick Test Program, VAV Units Only — Turn on power to unit. The field-supplied switch (or timeclock) must be closed to put unit into the occupied mode.

The quick test program utilizes the 2-digit LED (light-emitting diode) display (see Fig. 30) on the set point board to show status of all input and output signals to microprocessor. Display action and quick test procedures are described below.

The quick test program is a 33-step program that provides a means of checking all input and output signals of microprocessor prior to unit start-up. This check ensures that all control options, thermistors, and control switches are in proper working order.

When unit control switch is turned to ON position, a 20 will appear on the display. Immediately press display button once. An 88 will appear on the display and alarm light on display board will be energized; this indicates that microprocessor in control system is ready to run quick test program.

IMPORTANT: Do not allow unit control circuit to remain energized with 20 showing on display for more than 2 minutes. If display button is not pressed within this time period, control will attempt to start unit.

For each step of the 33-step program, display button must be pressed twice. On first press, step number is displayed; second press initiates required action and appropriate code is displayed as shown in Fig. 30.

NOTE: The step number is a numeral followed by a decimal point (a 2-digit number has a decimal point after each numeral). The action code number is one or 2 digits with no decimal point(s).

IMPORTANT: Once quick test is initiated, display button must be pressed at least once every 10 minutes for control to remain in quick test mode. If button is not pressed within this time, control will attempt to start the unit.

To recheck any step in quick test program, control must be recycled by turning unit control switch off for a few seconds, and then turning it back on again. Restart quick test program as described above and proceed through quick test steps. Press display button twice for each step until step to be rechecked is reached.

The quick test program is divided into 3 sections as described below and shown in Tables 17-19.

1. Quick Test Steps 1-1.3 — Unit Configuration and Switch Check

   The microprocessor in unit control system is programmed by 2 switch assemblies located on processor board (Fig. 29). The configuration header is factory set and cannot be changed in the field. The dip switch assembly contains 8 microswitches that must be set in accordance with the various options selected by the customer. All dip switches should be checked and set to proper position for options selected prior to the quick test. See Switch and Potentiometer Settings, VAV Units Only section on page 37 for factory switch settings. The dip switch functions and display codes are shown in Table 17.

2. Quick Test Steps 1.4-2.3 — Thermistor and Set Point Potentiometers

   In these steps, the microprocessor checks resistance values of all sensors and set point potentiometers to ensure that they are functional, connected properly, and set within proper range for unit configuration.

   Nominal resistance values for all sensors range from 363,000 to 219 ohms in accordance with Table 20. Normal display code for good sensors and potentiometers is 1. A display code of 0 indicates a faulty potentiometer, thermistor or wiring. A 0 display also indicates that option is not being used.

   Table 18 shows thermistor and set point potentiometer functions and quick test display codes.

3. Quick Test Steps 2.4-3.3 — Output Relays

   These quick test steps allow microprocessor to check output signals from relay boards in unit control system. In addition, operation of all the condenser fans and compressors are checked at each step.

   Normal display for Steps 2.4 through 2.8 is 1. In Steps 2.9 through 3.3, each compressor is started and allowed to run for approximately 10 seconds. At start-up, a 0 will appear on the display followed by a 1 in a few seconds. Steps 3.0 and 3.1 will always be 0 since there are unloaders.

   At end of the 10-second time period, a 0 will return to the display board indicating that test step has been successfully completed. The 1 indicates that compressor protection circuit (CPCS) was tested.

   Fan and compressor operating sequence for quick test Steps 2.4 through 3.3 are shown in Table 19.

If the quick test steps do not operate as described above, a defect exists in one or more of the following: relay being tested, electronic control, or unit wiring. Determine problem and correct.

Table 17 — Quick Test, Unit Configuration and Switch Check

QUICK TEST STEP NO.	NORMAL DISPLAY	DESCRIPTION	CONTROL SWITCH
1	01	Type Unit — Air-Cooled VAV	Configuration Header
2	2	No. of Compressors	Configuration Header
3	2	No. of Unloaders	Dip Switch No. 7
4	60	60-Hertz Power	Configuration Header
5	0 or 1	0 — No Reset (Switch Off) 1 — Reset On (Switch On)	Dip Switch No. 2
6	0 or 1	0 — No Economizer (Switch Off) 1 — Economizer On (Switch On)	Dip Switch No. 3
7	0 or 1	0 — No Warm-Up (Switch Off) 1 — Warm-Up Used (Switch On)	Dip Switch No. 4
8	0 or 1	0 — Demand Limit Not Used (Switch Off) 1 — Demand Limit Used (Switch On)	Dip Switch No. 5
9	0 or 1	0 — Enthalpy Switch Open 1 — Enthalpy Switch Closed	Enthalpy Switch
1.0	0 or 1	0 — Low-Pressure Switch Open 1 — Low-Pressure Switch Closed	Circuit no. 1 Low-Pressure Switch
1.1	0 or 1	0 — Low-Pressure Switch Open 1 — Low-Pressure Switch Closed	Circuit No. 2 Low-Pressure Switch
1.2	1	No Circuit 1 Oil Pressure Switch	None*
1.3	1	No Circuit 2 Oil Pressure Switch	None*

*Units are not equipped with oil pressure switches.

Table 18 — Quick Test, Thermistor and Potentiometer Check

QUICK TEST STEP NO.	NORMAL DISPLAY	DESCRIPTION	THERMISTOR OR POTENTIOMETER
1.4	1	1 — Thermistor OK 0 — Thermistor Faulty	Leaving Air Thermistor (T1)
1.5	1	1 — Thermistor OK 0 — Thermistor Faulty	Entering Air Thermistor (T2)
1.6	1	1 — Resistor OK 0 — Resistor Faulty	Circuit 1 Condenser Resistor (T3)*
1.7	1	1 — Resistor OK 0 — Resistor Faulty	Circuit 2 Condenser Resistor (T4)*
1.8	1	1 — Thermistor OK 0 — Thermistor Faulty or Option not used	Accessory Reset Thermistor (T10)
1.9	1	1 — Potentiometer OK 0 — Potentiometer Faulty	Leaving Air Set Point Potentiometer (P1)
2.0	1	1 — Potentiometer OK 0 — Potentiometer Faulty	Accessory Reset Potentiometer (P3)
2.1	1	1 — Potentiometer OK 0 — Potentiometer Faulty	Accessory Demand Limit Potentiometer (P4)
2.2	1	1 — Potentiometer OK 0 — Potentiometer Faulty	Minimum Position Economizer Potentiometer (P5)
2.3	1	1 — Potentiometer OK 0 — Potentiometer Faulty	Warm-Up Set Point Potentiometer (P6)

*Condenser fans are not controlled by thermistors.

Table 19 — Quick Test, Output Relay Check

QUICK TEST STEP NO.	NORMAL DISPLAY	DESCRIPTION	RELAY NUMBER
2.4	1	1 — Open Economizer	K7
2.5	1	1 — Close Economizer	K8
2.6	0 or 1	0 — No Heat 1 — Energize Fan Relay and Heat Relay	K9* and K10
2.7	1	Energize Condenser Fan 1	K11
2.8	0	Not Used	K12
2.9	0 then 1	Energize Compressor 1	K1
3.0	0	Energize Unloader 1	K2
3.1	0	Energize Unloader 2	K3
3.2	0 then 1	Energize Compressor 2	K5
3.3	0	Not Used	K6

*K9 (fan relay) will remain on for duration of quick test.

Table 20 — Sensor Resistance Values

TEMP (F)	RESISTANCE (Ohms)	TEMP (F)	RESISTANCE (Ohms)	TEMP (F)	RESISTANCE (Ohms)
−60	362,640	**45**	11,396	**150**	1,020
−55	297,140	**50**	9,950	**155**	929
−50	245,245	**55**	8,709	**160**	844
−45	202,841	**60**	7,642	**165**	768
−40	168,250	**65**	6,749	**170**	699
−35	139,960	**70**	5,944	**175**	640
−30	116,820	**75**	5,249	**180**	585
−25	98,420	**80**	4,644	**185**	535
−20	82,665	**85**	4,134	**190**	490
−15	69,685	**90**	3,671	**195**	449
−10	58,915	**95**	3,265	**200**	414
−5	50,284	**100**	2,913	**205**	380
0	42,765	**105**	2,600	**210**	350
5	36,475	**110**	2,336	**215**	323
10	31,216	**115**	2,092	**220**	299
15	26,786	**120**	1,879	**225**	276
20	23,164	**125**	1,689	**230**	255
25	19,978	**130**	1,527	**235**	236
30	17,276	**135**	1,377	**240**	219
35	14,980	**140**	1,244		
40	13,085	**145**	1,126		

Variable Air Volume Units (50DK,DY) Cooling

1. Be sure all dip switches and jumpers are properly set (see Switch and Potentiometer Settings, VAV Units Only section on page 37 for details on proper positions). Be sure potentiometers are all properly set (see Switch and Potentiometer Settings, VAV Units Only section on page 37 for allowable settings).
2. Turn on power to unit and run quick test as described in Quick Test Program section on page 39.
3. Set cold temperature set point (on display board) to approximately 45 F. This will ensure that unit will be calling for cooling and will make it easy to determine that unit is working properly after it is initially started.
4. After ensuring that all the steps outlined in Quick Test Program, VAV Units Only section on page 39 have been taken and that all proper wiring connections have been made to unit, unit can be started by turning the ON-OFF switch (located on bracket with display board) to ON position. As soon as switch is turned on, a [20] will appear on display for 3 minutes. During this time period, control will initialize internal constants and determine resistance range for full economizer operation. Unit will go into quick test if display button is pushed during this 3-minute time period.

   After 3-minute time delay, unit will turn off display and proceed to operate. Check air leaving room terminals; if unit is operating properly, air should be cold. The capacity steps can also be read from display by holding in display button. The display will show a number between [0] and [6] to indicate which capacity step the unit is in.

> IMPORTANT: If unit has an alarm condition or is operating in a special mode (warm-up, demand limit, or reset), display will show these codes rather than capacity stage code. If a status code or an alarm code is displayed, display will rotate every 2 seconds and display up to 3 codes. Alarm codes take priority over all other codes. If an alarm condition exists, alarm light will light and a code number from 51-87 will be on the display.

5. If the unit is equipped with modulating power exhaust, the power exhaust motor will turn on whenever the enthalpy is below setting on enthalpy switch and the unit is in the occupied mode. The power exhaust damper position will modulate to satisfy the setting of the differential pressure switch.
6. When sure that unit is operating correctly, set the cooling temperature set point to the desired setting.

Variable Air Volume Units, Warm-Up Heat (50DK,DY Units with Optional Electric Heat)

1. Check that all dip switches and jumpers are properly set as described in Switch and Potentiometer Settings, VAV Units Only section on page 37. Check that potentiometers are properly set as described in Switch and Potentiometer Settings, VAV Units Only section on page 37. Dip switch 4 must be in ON position.
2. Turn on power to unit and run quick test as described in Quick Test Program, VAV Units Only section on page 39.
3. Set potentiometer P6 (on accessory board) to a temperature that is at least 5° F or more higher than return-air temperature (unit will not go into heating unless return-air temperature is 5° F or more below warm-up temperature set point, P6).
4. After ensuring that all steps outlined in Quick Test Program, VAV Units Only section on page 39 have been taken and that all proper wiring connections have been made to unit, unit can be started by turning the ON-OFF switch (located on bracket with the display board) to ON position. As soon as switch is turned on, a [20] will appear on display for 3 minutes. During this time period control will initialize internal constants and determine resistance range for full economizer operation. Unit will go into quick test if display button is pushed during this 3-minute period.

   Once 3-minute period is over, unit will shut off display and unit is allowed to start. Assuming return-air temperature (T2) is 5° F or more below warm-up set point, unit will go into heating mode. This can be checked by pressing display button; if unit is in the warm-up mode, a [26] will appear on display. Also check air leaving room terminals; it should be warm.

   While unit is in warm-up mode, economizer outdoor-air dampers are fully closed.

   The unit will remain in heating mode until the return air temperature is 2° F below the setting on P6. The unit can go in and out of the heating mode until the return-air temperature rises above the setting on P6.

   The warm-up cycle will be terminated when return-air temperature rises above warm-up set point temperature. Once unit goes out of the warm-up cycle, it cannot go back into it until a power-on reset occurs (i.e., turn off power and then turn it back on).
5. Set warm-up set point (P6) to desired position.

Operating Sequences

CONSTANT VOLUME UNITS (50DJ,DW)

Cooling, Units Without Economizer — Turn unit power to ON position. Set system selector switch at COOL or AUTO. position and fan switch at AUTO. position. Set thermostat at setting below room temperature.

Y1 on the thermostat subbase closes, energizing compressor no. 1 as first stage of cooling. (Compressor no. 1 is always the larger of the 2 unit compressors.) If cooling load cannot be satisfied with only first-stage cooling, Y2 on the thermostat will close, energizing compressor no. 2.

Condenser fans are energized with compressor no. 1. The no. 1 fan runs continuously while the unit is on mechanical cooling; the no. 2 fan is cycled on and off for head pressure control. Check cooling effects at a setting above room temperature. Compressors will shut off.

Heating, Units Without Economizer — Turn unit power to ON position. Set system selector switch at HEAT position, fan switch at AUTO. position; and thermostat at setting above room temperature:

When W1 on the thermostat closes, the first stage of electric heat is energized. On a further drop in room temperature, W2 on the thermostat closes, energizing the second stage of electric heat.

NOTE: Units equipped with low electric heat option have only one stage. Reset thermostat to a setting below room temperature, and unit should shut off.

Cooling, Units With Economizer — With system selector switch set at COOL position and fan switch set at AUTO. position, evaporator fan is energized when Y1 on thermostat closes. If enthalpy is below setting on enthalpy switch, the economizer outdoor-air dampers will modulate open to satisfy the cooling requirement. If outdoor-air alone will not meet the cooling requirements, Y2 on the thermostat will close, energizing compressor no. 1 to work in conjunction with the modulating economizer to meet the cooling requirement. While the unit is operating using outdoor air, compressor no. 2 cannot be energized. If enthalpy is above setting on enthalpy switch, the economizer outdoor-air dampers move to the minimum (ventilation) position, and condenser fans no. 1 and 2 cycle on and off as described in Cooling, Units Without Economizer section on page 42.

NOTE: If fan switch is in the ON position and the room thermostat is satisfied, the outdoor-air dampers move to the minimum position.

Heating, Units With Economizer — Operation is the same as described in Heating, Units Without Economizer section above, except that the outdoor-air dampers move to the minimum position.

VARIABLE VOLUME UNITS (50DK,DY)

Cooling — During unit off cycle, crankcase heaters are energized to keep refrigerant from migrating to compressors.

When field-supplied switch or timeclock places unit in the occupied mode, supply-air fan starts and microprocessor goes through a 3-minute initialization period (assuming that the control ON-OFF switch is in ON position) during which display will continuously show 20 .

During initialization period, effective range of economizer feedback potentiometer P2 is established. P2 is used to sense position of economizer dampers. For approximately 60 seconds of initialization period, dampers are driven fully open and full open resistance of potentiometer is recorded by microprocessor. The dampers are then driven to fully closed position and this potentiometer resistance is also recorded by microprocessor. These 2 readings establish effective range of the economizer potentiometer.

Upon completion of initialization mode, the control operates unit to try to maintain the temperature at the cooling temperature set point (mounted on the display board). This is potentiometer P1. The control will always try to use economizer as first stage of cooling, enthalpy permitting. Enthalpy permitting, control will open economizer dampers and try to maintain leaving-air temperature at the cold temperature set point minus 2° F. If economizer dampers are fully open and still cannot maintain desired leaving-air temperature, control will begin to cycle on compressors and condenser fans. Once mechanical cooling begins, control strives to maintain leaving-air temperature at cold temperature set point rather than at the cold temperature set point minus 2° F.

The microprocessor determines how rapidly capacity steps are added or subtracted based on deviation from leaving-air set point and rate of change of leaving-air temperature.

If enthalpy is such that economizer cannot be used for cooling, dampers will go to their minimum position as set by potentiometer P5 (located on accessory reset board). The control will then use mechanical cooling to meet the cooling load.

Units With Morning Warm-Up Heat (Optional Electric Heat) — When in heating mode, room terminals must be wide open.

Dip switch 4 (located on the processor board) must be in ON position.

If return-air temperature (T2) is 5° F below warm-up temperature set point P6 (located on the accessory board), heating relay will be energized and heat will be brought on and will run until return-air temperature is above 2° F below setting on P6. During heating, economizer dampers will be fully closed. The unit can go in and out of heating until return-air temperature rises above the setting on P6. After the return-air temperature rises above the warm-up set point, unit cannot go back into heating mode until a power-on reset occurs (i.e., power is turned off and then turned back on).

Units Equipped With Space Temperature Reset — Unit operates exactly like a unit without reset until reset is used. When unit is operating in reset mode, a code of 21 will appear on display when display button is pushed; this means that control is controlling to a leaving-air set point different than that set using P1.

Units Equipped With Demand Limit — Unit operates exactly like standard VAV units until demand limiting takes effect and limits amount of compression that will be allowed to be brought on.

BUILDING PRESSURIZATION MODE, ALL UNITS — Building pressurization is used to pressurize conditioned space in the event of a fire or smoke condition. On a large building with multiple zones, it may be desirable to pressurize a zone that does not have smoke in it to keep smoke from entering the zone from other zones that may be filled with smoke.

In building pressurization mode, supply-air fan operates with outdoor-air dampers wide open (on units with economizer) and if unit is equipped with return/exhaust fan option, exhaust damper opens, and the fan is off. This pumps outdoor air into the zone but does not exhaust it; resulting in the zone becoming positively pressurized.

All switches and wiring required for building pressurization must be field supplied and wired. On VAV units, terminals are provided to make this job easier.

To go into pressurization mode, power to the control circuit must be interrupted. This can be done using alarm relay contacts described in Fig. 24. These contacts can be energized by a relay in a smoke detector, a firestat, or by a relay that is manually energized in a central control room. Switches must be field installed to energize supply-air fan, drive economizer dampers wide open and, on VAV units, drive supply-air fan inlet guide vanes wide open. After power to control circuit is interrupted, these switches must be manually closed to put unit into pressurization mode; switches would probably be located in a central control room. If unit is equipped with return/exhaust fan option, return-air fan should be off.

SMOKE PURGE MODE, ALL UNITS — In order to use smoke purge, unit must be equipped with return/exhaust fan option.

Smoke purge is used to exhaust smoke from a zone in the event of a fire or heavy smoke condition. In this mode, power exhaust fan runs, supply fan is shut off and economizer dampers are wide open. With power exhaust fan running and exhaust damper wide open, smoke-filled air is exhausted out of the conditioned space to the outside.

With smoke purge mode, it is necessary to interrupt power to unit control circuit as described above for building pressurization. All switches and wiring for putting unit into smoke purge mode must be field supplied and installed. Terminals have been provided in unit control box to facilitate field hookups.

The field-installed switches must energize return-air fan, drive economizer dampers wide open and, on VAV units, drive return-air fan inlet guide vanes wide open. After power is interrupted to unit control circuit, these switches must be manually closed to place unit into smoke purge mode. As with building pressurization switches, these switches would probably be located in a central control room.

VARIABLE VOLUME UNITS EQUIPPED WITH THE STATIC PRESSURE CONTROL OPTION — If unit is equipped with static pressure control option, differential pressure switch will modulate fan inlet guide vanes to vary airflow to maintain set point of the switch. See Differential Pressure Switch Set Point and Null Span sections on page 49 for details on setting switch set point and null span.

For example, assume that set point on supply fan differential switch is 1.9 in. wg. If pressure in supply duct goes above 1.9 in. wg, switch will make to the normally-open contact and energize inlet guide vane motor to drive inlet guide vanes to a more closed position, thus reducing airflow and lowering duct pressure. Once set point pressure is reached, switch will open and deenergize inlet guide vane motor. If pressure in supply duct is below 1.9 in. wg, the switch will make to the normally-closed contact and energize inlet guide vane motor to drive inlet guide vane to a more open position; increasing airflow and raising duct pressure. Once again, once desired pressure has been reached, switch will open and deenergize inlet guide vane motor. How far above or below the set point setting the switch goes before energizing depends on setting of null span (null span is pressure change that can be made without contacts opening or closing). If null span is at maximum position, pressure will vary from 0.17 in. wg to 0.31 in. wg depending on set point (if set point is at minimum setting, null span will be 0.17 in. wg, while if it is at maximum position, the null span will be 0.31 in. wg) before switch acts. If null span is adjusted to a minimum setting, duct pressure will vary from 0.06 in. wg to 0.11 in. wg (again depending on switch set point) before switch acts. Setting null span to minimum position will result in a smaller pressure fluctuation than if it is set at maximum position.

The modulating power exhaust option switch operates in same manner as supply switch except that it has a different set point range and null span.

VENTILATION AIR CIRCULATION (CONTINUOUS FAN) — Turn unit power to ON position, and set system selector switch at OFF, HEAT, or COOL position. Set fan switch at ON position:

Indoor (evaporator) fan contactor (IFC) is energized through the switch on the thermostat and the evaporator fan runs continuously.

AUTOMATIC CHANGEOVER USING AUTOMATIC CHANGEOVER THERMOSTAT — Turn unit power to ON position, and set system selector switch at AUTO. position:

When the temperature of the conditioned space rises to the cooling selector lever setting, unit automatically switches from the heating mode to the cooling mode. When the temperature of the conditioned space falls to the heating selector switch setting, unit automatically changes from cooling mode to heating mode. The thermostat is interlocked so that cooling and heating systems do not operate at the same time.

Head Pressure Control — All units have a fan cycling thermostat which cycles the no. 2 condenser fan. (The no. 2 condenser fan is located over the control box.) This switch opens at 60 F ± 3° F and closes at 70 F ± 3° F. This allows the unit to operate down to 45 F outdoor ambient temperature.

SERVICE

Service Access — All unit components can be reached through clearly labeled hinged access doors. These doors are not equipped with tiebacks, so if heavy duty servicing is needed, either remove them or prop them open to prevent accidental closure.

Each door is held closed with 3 latches. The latches are secured to the unit with a single ¼-in.—20 x ½-in. long bolt. See Fig. 32.

To open, loosen the latch bolt using a 7/16-in. wrench. Pivot the latch so it is not in contact with the door. Open the door. To shut, reverse the above procedure.

NOTE: Disassembly of the top cover may be required under special service circumstances. It is very important that the orientation and position of the top cover be marked on the unit prior to disassembly. This will allow proper replacement of the top cover onto the unit and prevent rain water from leaking into the unit.

IMPORTANT: After servicing is completed, make sure door is closed and relatched properly, and that the latches are tight. Failure to do this can result in water leakage into the indoor-air section of the unit.

COMPRESSORS — Access to the compressors is through the door on the right side of the unit (when facing the condenser coil). This door also provides access to the discharge and liquid line service valves, the crankcase heaters, the filter driers, the sight glasses, and the high- and low-pressure switches. Compressor no. 1 is compressor closest to the condenser coil.

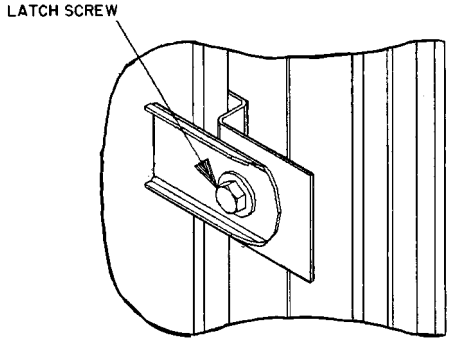


Fig. 32 — Door Latch

EVAPORATOR-FAN MOTORS, PULLEYS, AND BELTS — Access to these components is through the 2 doors labeled FAN SECTION on the left side of the unit (when facing condenser coil).

UNIT CONTROL BOX — Access to this component is through the door marked ELECTRICAL SECTION on the left side of the unit (when facing condenser coil). Unit control box for constant volume units contains (see Fig. 18):

- compressor circuit breakers CB1 and CB2
- indoor (evaporator) fan motor circuit breaker IFCB
- compressor contactors C1 and C2
- indoor (evaporator) fan motor contactor IFC
- outdoor (condenser) fan motor contactors OFC1 and OFC2
- circuit breaker, 24-v, CB4
- circuit breaker, 115-v, CB3
- power exhaust contactor (optional) PEC
- heat relay HR1
- heat relay HR2
- constant volume control board CV
- economizer board (optional) ECON
- plugs PL2, PL3, PL4, PL5, and PL6
- power transformer TRAN1
- control circuit transformer TRAN2
- ground lug EQUIP GND
- power terminal block TB1
- 115-v terminal block TB2
- 24-v terminal strip, located on CV board, Pl

For variable volume units, the main control box contains the following components (see Fig. 22):

- compressor circuit breakers CB1 and CB2
- indoor (evaporator) fan motor circuit breaker IFCB
- compressor contactors C1 and C2
- indoor (evaporator) fan motor contactor IFC
- outdoor (condenser) fan motor contactors OFC1 and OFC2
- circuit breaker, 24-v, CB4
- circuit breaker, 115-v, CB3
- power exhaust contactor (optional) PEC
- heat relay HR1
- plugs PL2, PL3, PL4, PL5, PL6, PL7, PL8 and PL9
- power transformer TRAN1
- control circuit transformer TRAN2
- processor board
- accessory board
- display set point board
- compressor relays CR1 and CR2
- power terminal block TB1
- 115-v terminal block TB3
- 24-v terminal block TB2
- occupied mode relay OMR
- heating interlock relay HIR
- economizer relay ECR
- ground lug EQUIP GND

ELECTRIC HEAT CONTROL BOX

Models 50DJ,DK — On these units, access to the electric heat control box is through the door marked FAN SECTION on the back end of the unit. (End opposite condenser coil.) Be sure to use the correct door, as there are 3 doors labelled FAN SECTION.

Models 50DW,DY — On these units, access to the electric heat control box is through the door marked HEAT SECTION.

All Units — Electric heat control box contains (see Fig. 33):

- power terminal block HTB (high-heat units only)
- fuse blocks, FB1, FB2, etc.
- fuses FU (3 per fuse block)
- heater contactors HC1, HC2, etc.

HEATER BOX

Models 50DJ,DK — Access to the heater box on these units is through the last door on the left side of the unit (when facing condenser coil). Door is marked FAN SECTION. Box is mounted directly under evaporator fan.

Models 50DW,DY — Access to the heater box on these units is through the door marked HEAT SECTION.

All Units — Heater box contains:

- heater limit switches LS1, LS2, etc.
- heater elements HTR1, HTR2, etc.

NOTE: Only the heater element connectors are located in the heater box. The heater elements themselves are in the airstream.

ECONOMIZER DAMPER MOTOR — On units so equipped, the economizer motor is located on a bracket in the return-air section. Access to it is through the door labeled FILTER SECTION on the far end of the unit (when facing condenser coil).

25% OUTDOOR-AIR DAMPER — Access to adjust the 25% outdoor-air damper is through the door marked filter section. To adjust the far side linkage arm, climb into the unit.

POWER EXHAUST MOTOR — Remove the power exhaust hood to gain access to motor.

MODULATING POWER EXHAUST DAMPER MOTOR (VAV Units with Modulating Power Exhaust Option) — The modulating power exhaust damper motor is located in the power exhaust hood assembly. Access to the motor is through the lower right-hand hood side plate (right-hand side when facing the hood). To reach the motor, remove the channel clip between economizer hoods and power exhaust fan deck and remove the 8 screws in the hood side plate.

RETURN-AIR FILTERS — Access to these filters is through the door marked FILTER SECTION.

CONDENSER FANS AND FAN MOTORS — Remove the wire fan guard on top of the unit to gain access to the condenser fans and motors.

INLET GUIDE VANE MOTOR (VAV Units with Inlet Guide Vane and Static Pressure Control Option) — The inlet guide vane motor is located next to the evaporator fan. Access is the same as for evaporator-fan motor, pulleys and belts, as described in Service Access section on page 44. Figure 34 shows the location of the inlet guide vane damper motor on the 50DK units. Figure 35 shows the location on the 50DY units.

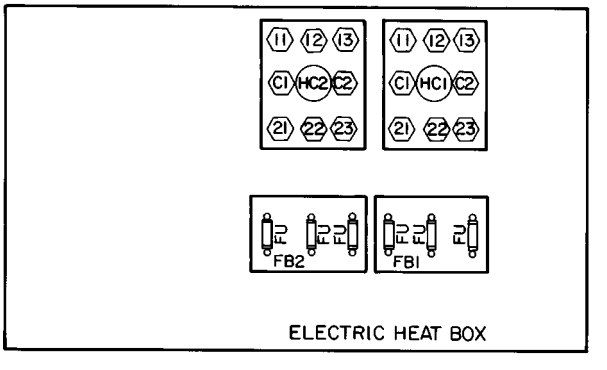


Fig. 33 — Typical Electric Heat Control Box Component Arrangement (Low-Heat Shown)

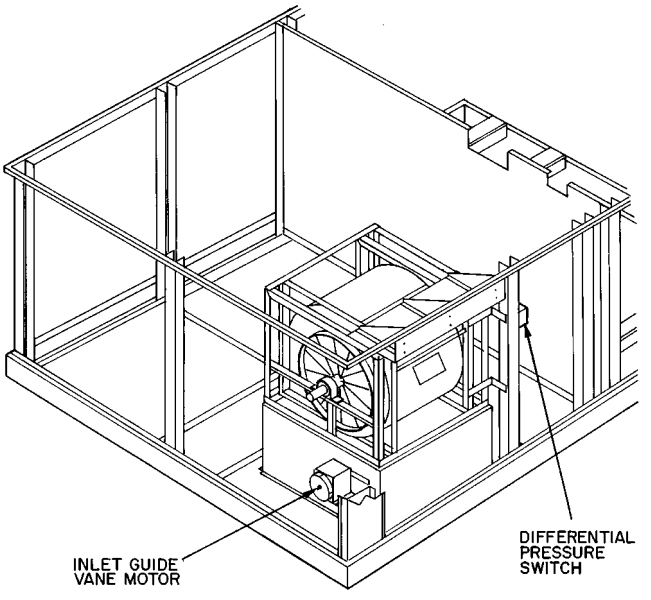


Fig. 34 — Location of Differential Pressure Switch and Inlet Guide Vane Motor (50DK Units)

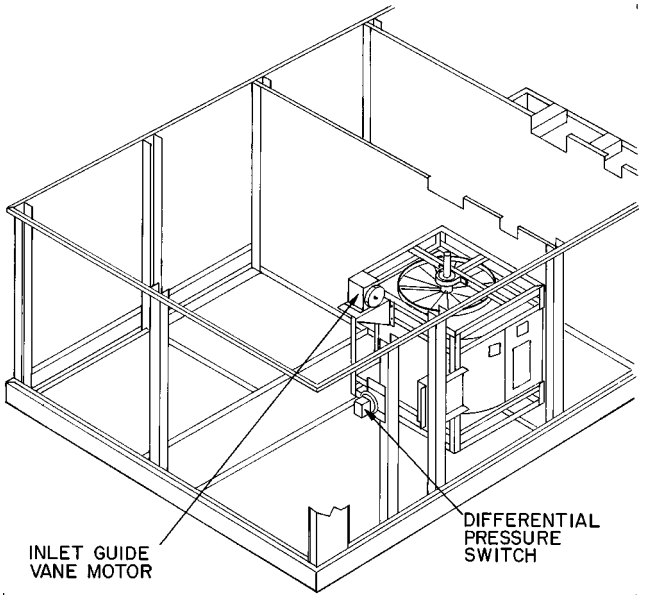


Fig. 35 — Location of Differential Pressure Switch and Inlet Guide Vane Motor (50DY Units)

MODULATING POWER EXHAUST DIFFERENTIAL PRESSURE SWITCH — The differential pressure switch is located in the small control box mounted on the corner post next to the access door labeled FILTER SECTION. See Fig. 36. To gain access to this box, remove the control box cover. When replacing cover, be sure to properly secure it in order to prevent water from being drawn into the unit.

This box also contains a pressure gage and a 24-v transformer for powering the modulating power exhaust damper motor.

INLET GUIDE VANE DIFFERENTIAL PRESSURE SWITCH (VAV Units with Inlet Guide Vane and Static Pressure Control Option) — On the 50DK units, the inlet guide vane motor differential pressure switch is located on the post on the right-hand side of the blower assembly (right-hand side when facing the blower assembly). Access is through

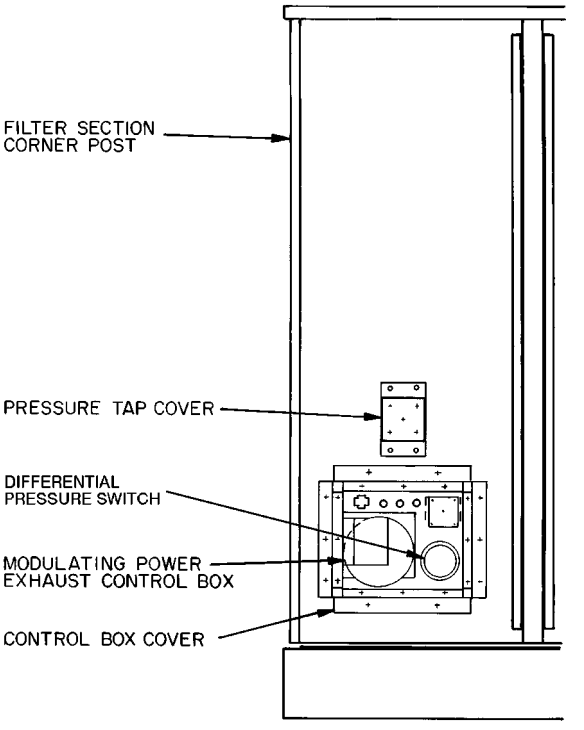


Fig. 36 — Location of Modulating Power Exhaust Control Box — VAV Units

the access door labeled FAN SECTION; this door is right next to the access door to the main unit control box. See Fig. 34.

On the 50DY units, the inlet guide vane motor differential pressure switch is located on the post on the left-hand side of the blower assembly (when facing the blower assembly). Access is through the access door labeled FAN SECTION on the end of the unit (opposite condenser section of the unit). See Fig. 35.

Cleaning — Inspect unit at the beginning of each heating and cooling season and during each season as operating conditions may require.

Clean condenser coil with a vacuum cleaner, fresh water, compressed air, or a bristle brush (not wire). Coil cleaning should be a part of the planned maintenance program. Clean evaporator coil with a stiff bristle brush (not wire), vacuum cleaner, or compressed air.

Check and clean condensate drain annually at the start of the cooling season. In winter, keep drain and traps dry or protect against freeze-up.

Replace return air filters at the start of each heating and cooling season or as often as necessary during each season, depending on operating conditions. See Tables 1A and 1B for filter types, quantities, and sizes.

Remove economizer outdoor-air filters from the hoods by removing the filter retainers. Clean filters with steam or hot water and mild detergent. Reinstall in hoods after cleaning. Never replace cleanable filters with throwaway filters.

Lubrication

COMPRESSORS — Each compressor is correctly charged at the factory. Refer to 06D Compressor Service Manual if additional information regarding compressor lubrication system is required.

FAN SHAFT BEARINGS — Lubricate fan shaft bearings at least once a year with suitable bearing grease. Typical lubricants are given below:

Manufacturer	Lubricant
Texaco	Regal AFB-2*
Sunoco	Prestige 42
Texaco	Multifak 2
Mobil	Mobilplex EP No. 1

*Preferred lubricant because it contains rust and oxidation inhibitors.

On 024 and 030 units, the fan shaft roller bearing (drive end bearing) should be relubricated after the first 600 hours of operation.

FAN MOTOR BEARINGS — The condenser and the evaporator-fan motors have sealed bearings so no field lubrication is required.

DOOR HINGES — All door hinges should be lubricated at least once a year.

Adjustments

EVAPORATOR-FAN MOTOR PLATE — Adjust using a 15⁄16-in. wrench on the bolts shown in Fig. 37A and 37B. Turn the bolts counterclockwise to move the motor mounting plate toward the fan and loosen the belts; turn clockwise to move the plate away from the wheel and tighten the belts. Make the same number of turns to each bolt.

BELT INSTALLATION AND TENSIONING

NOTE: When installing or replacing belts, always use a complete set of new, matched belts. Mixing belts often results in premature breakage of the new belts.

Turn off unit power. Adjust motor plate so belts can be installed without stretching over the grooves of the pulley. (Forcing the belts can result in uneven belt stretching and a mismatched set of belts.)

Before tensioning the belts, equalize belt slack so that it is on the same side of the belt for all belts. Failure to do so may result in uneven belt stretching. Tighten belts using the motor plate adjusting bolts. Adjust until proper belt tension (½-in. deflection with one finger) is obtained. Be sure to adjust both adjusting bolts the same number of turns. Check the tension at least twice during the first day of operation, as there is normally a rapid decrease in tension until the belts have run in. Check tension periodically thereafter and maintain the recommended tension.

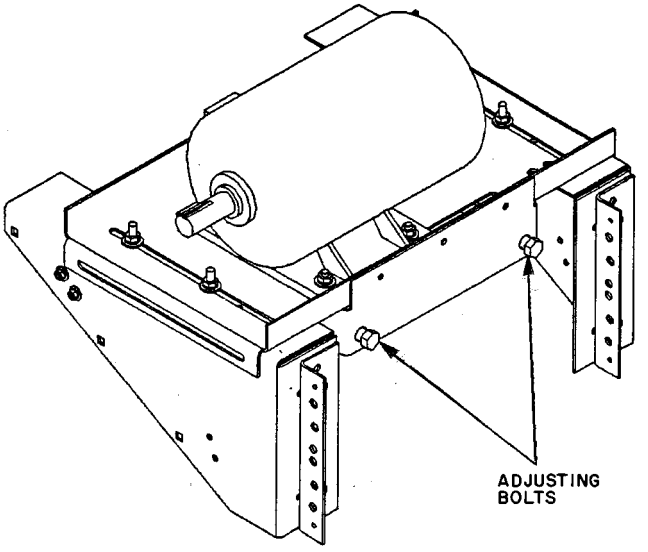


Fig. 37A — Evaporator-Fan Motor Adjustment — Models 50DJ,DK (Vertical Supply and Return)

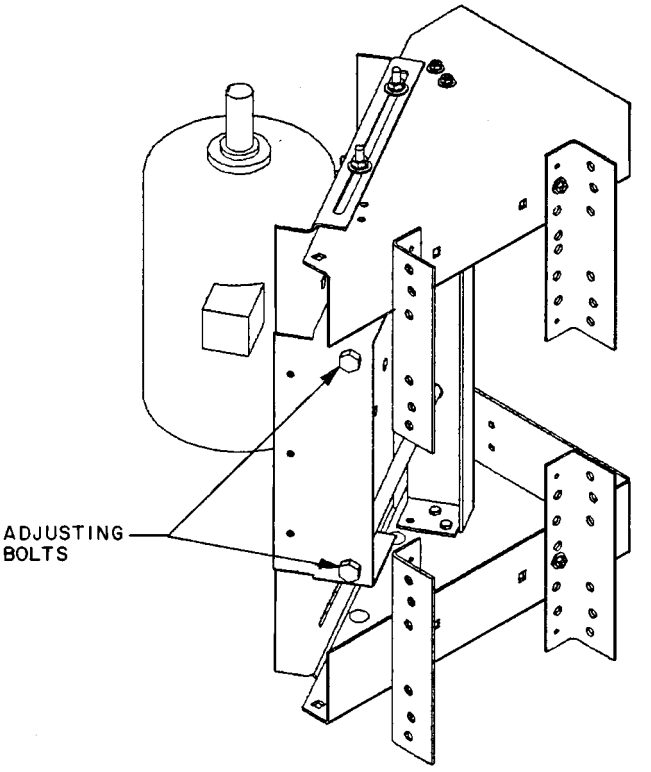


Fig. 37B — Evaporator-Fan Motor Adjustment — Models 50DW,DY (Horizontal Supply and Return)

With the correct belt tension, belts may slip and squeal momentarily on start-up. This slippage is normal and disappears after wheel reaches operating speed. Excessive belt tension shortens belt life and may cause bearing and shaft damage.

PULLEY ALIGNMENT — For proper belt life, the motor and fan pulleys must be properly aligned. To check, first turn off unit power. Place a straight edge against the motor and fan pulleys. If the pulleys are properly aligned, the straight edge should be parallel to the belts. See Fig. 38.

If they are not parallel, check that the motor shaft and fan shaft are parallel. If they are not, adjust the motor plate adjusting bolts until they are.

After verifying that the shafts are parallel, loosen the setscrews on the motor pulley. Move pulley on the shaft until the pulleys are parallel. To move the sheave on the shaft, loosen the belts. If necessary, blower pulley can also be moved on the shaft.

INSTALLING ALTERNATE MOTOR PULLEY — On all units, the alternate motor pulley is field supplied. See Tables 9A and 9B. To install an alternate pulley:

1. Turn off unit power.
2. Loosen belts using motor adjusting bolts until belts can be removed without stretching them over the grooves of the pulley.
3. Remove belts.
4. Loosen setscrews on motor pulley.
5. Slide pulley off motor shaft. Make sure setscrews on new pulley are loose.
6. Slide new pulley onto fan shaft and align it with the fan pulley as described above.
7. Tighten setscrews.
8. Install belts and tension properly as described above.

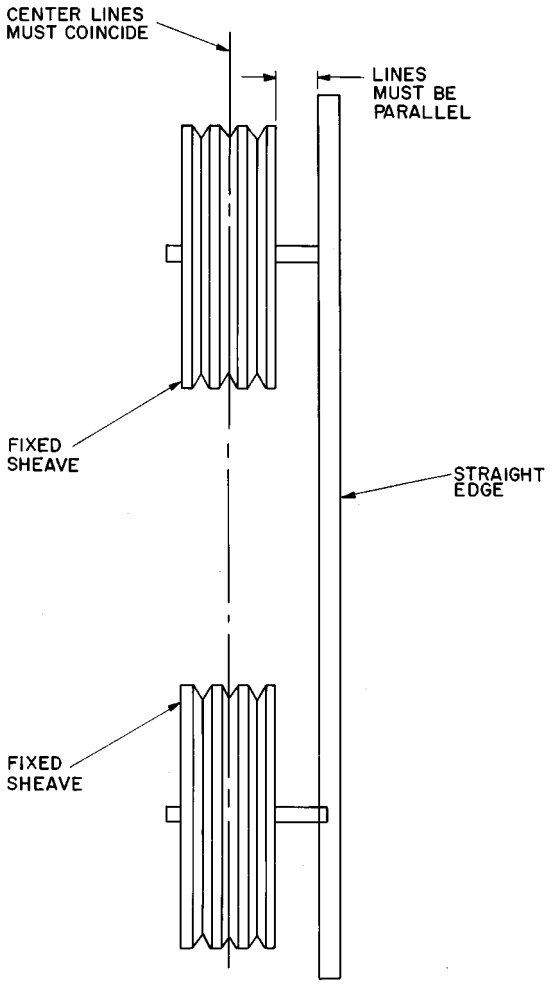


Fig. 38 — Pulley Alignment

CONDENSER FAN — To adjust condenser fans:

1. Turn off unit power.
2. Remove fan guard and loosen fan hub setscrew.
3. See Fig. 28 and adjust fan height using a straight edge laid across the fan deck.
4. Tighten setscrew and replace rubber hubcap to prevent hub from rusting to the motor shaft.
5. Fill hub recess with Permagum if hub has no rubber hubcap.
6. Replace fan guard.

ENTHALPY CONTROL, MAT, AND ECONOMIZER DAMPER VENT POSITION — See Economizer Settings section, page 8, for adjustment procedures.

25% OUTDOOR-AIR DAMPER — See Outdoor-Air Inlet Adjustments section on page 8 for adjustment details.

AUXILIARY SWITCH, POWER EXHAUST — All constant volume units have an auxiliary switch located on the economizer damper motor. Switch is factory set to prevent the power exhaust from operating when the economizer is less than 50% open. If other than factory setting is desired, adjust as follows:

⚠ CAUTION

Do not turn motor shaft by hand or with wrench. Damage to the gear train will result.

1. Remove top cover from motor to gain access to motor terminals and cam adjustments.
2. Disconnect controller from motor. Connect red, white, and blue terminals on the 135 ohm manual potentiometer to corresponding red, white, and blue terminals on the motor. Connect 24-vac power to Terminals 1 and 2. See Fig. 39.
3. Adjust the 135 ohm potentiometer so that the motor shaft turns to the position where auxiliary equipment is to be switched.
4. Adjust auxiliary cam by inserting a ⅛-in. straight blade screwdriver into slot on cam and moving TOP of screwdriver to the right or left. See Fig. 40.
5. To close auxiliary switch, switch red and blue contacts as the motor travels open (energizing the power exhaust motor), the switch differential can only be 10 degrees on both switches. To adjust either cam, perform the following steps:
   a. If red and blue contacts are open, rotate the cam counterclockwise until the contacts close.
   b. If the red and blue contacts are closed, rotate the cam clockwise until the contacts open.
6. Check for proper auxiliary switching (including differential) by running motor through full stroke, using 135 ohm potentiometer. Repeat adjustment if necessary.
7. Disconnect 135 ohm potentiometer, reconnect controller and place top cover on motor.

NOTE: Adjusting the auxiliary switch does not require running the motor.

DIFFERENTIAL PRESSURE SWITCH SET POINT AND NULL SPAN (VAV Units Only When Equipped with Inlet Guide Vane and Static Pressure Control Option) — See Fig. 34 and 35 for location of switches in unit. Differential pressure switch has an adjustable set point range of 1.1 in. wg to 3.5 in. wg. Factory setting is 1.9 in. wg. To adjust set point, turn set point adjusting screw (see Fig. 41) clockwise to decrease set point and counterclockwise to increase set point. This switch also has an adjustable null span. The null span is the pressure change that can be made without contacts opening or closing. It is adjustable from 0.06 in. wg to 0.17 in. wg when set point is at minimum position (1.1 in. wg) and 0.11 in. wg to 0.31 in. wg when set point is at maximum position (3.5 in. wg). To adjust

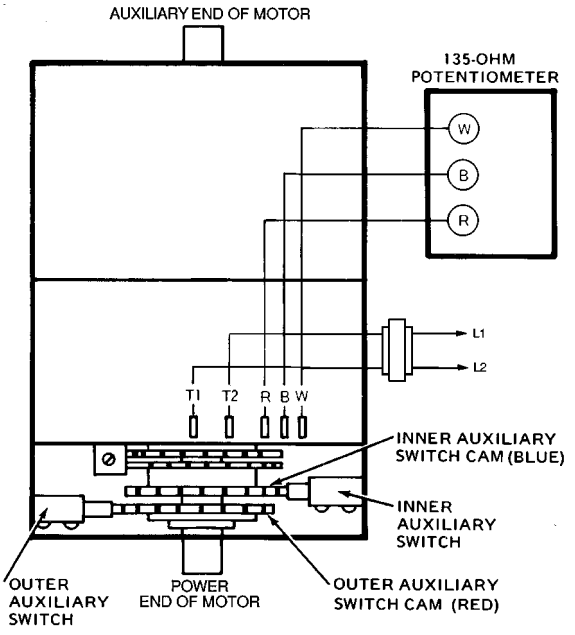


Fig. 39 — Auxiliary Switch Stroke Adjustment

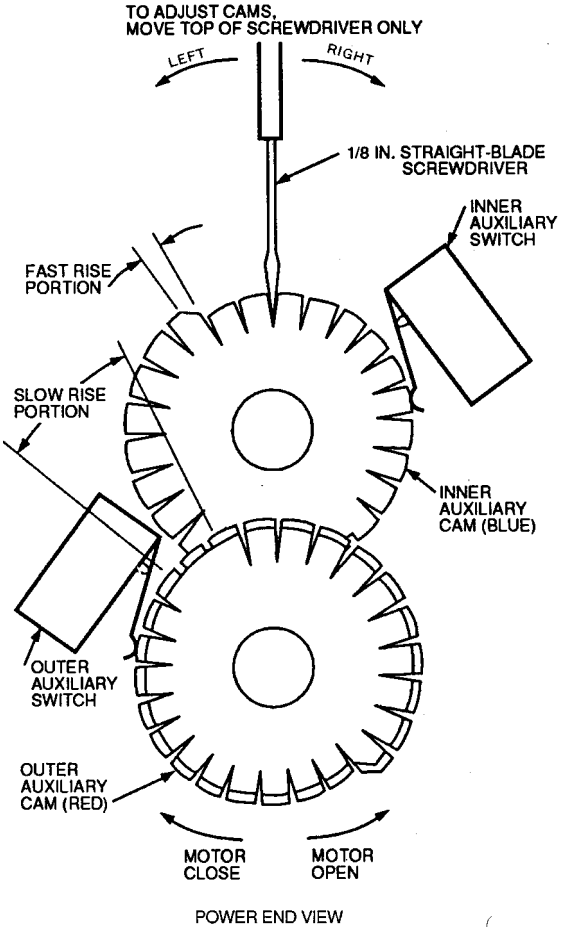


Fig. 40 — Auxiliary Switch Adjustment

null span, turn null adjusting screw (Fig. 41) clockwise to decrease span and counterclockwise to increase span. All switches leave factory with null span set at maximum position. The smaller the null span, the closer the pressure will be maintained to desired set point.

DIFFERENTIAL PRESSURE SWITCH SET POINT AND NULL SPAN (VAV Units Only When Equipped with Modulating Power Exhaust Option) — See Fig. 36. The set point range for this switch is −0.5 in. wg to +0.5 in. wg. Factory setting is +0.1 in. wg. To adjust set point, turn set point adjusting screw (See Fig. 41) clockwise to decrease set point and counterclockwise to increase set point. This switch also has an adjustable null span. The null span is the pressure change that can be made without contacts opening or closing. It is adjustable from 0.06 in. wg to 0.14 in. wg when set point is at minimum position (−0.5 in wg) and 0.07 in. wg to 0.14 in. wg when set point is at maximum position (+0.5 in. wg). To adjust null span, turn null adjusting screw (Fig. 41) clockwise to decrease span and counterclockwise to increase span. All switches leave factory with null span set at maximum position. The smaller the null span, the closer the pressure will be maintained to desired set point.

REFRIGERANT CHARGE — All units are shipped with a complete operating charge of R-22. See unit nameplate and Tables 1A and 1B for amount of charge. When charging refrigerant system, refer to Carrier Standard Service Techniques, Refrigerants. When adding a complete charge, evacuate system using standard evacuating procedures and weigh in the specified amount of charge. All units have charging charts for each refrigerant circuit. See Fig. 42-47.

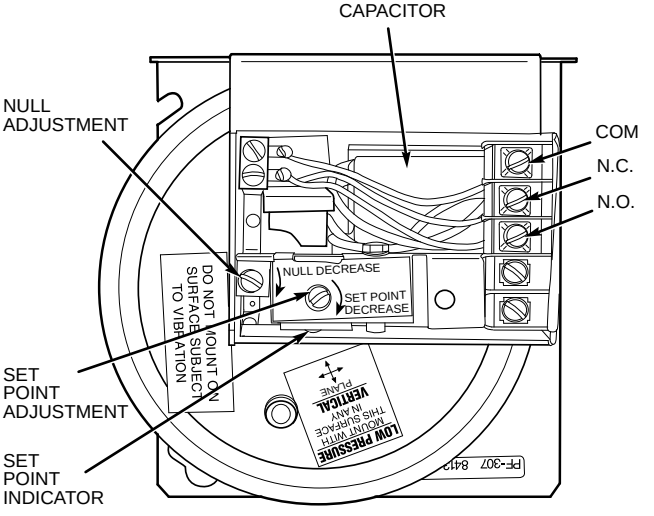


Fig. 41 — Differential Pressure Switch for Inlet Guide Vane and Static Pressure Control Option and Modulating Power Exhaust Option

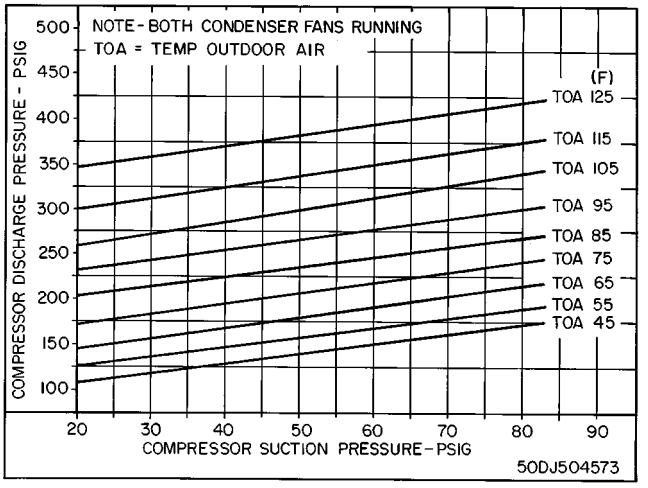


Fig. 42 — Charging Chart; 50DJ,DK,DW,DY024; System 1

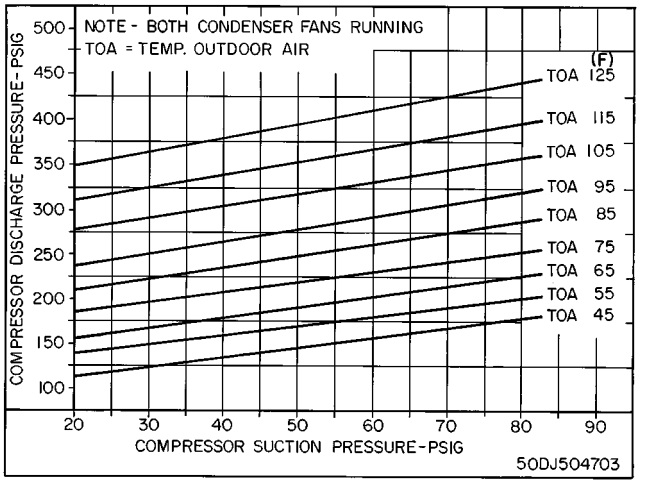


Fig. 45 — Charging Chart; 50DJ,DK,DW,DY028; System 2

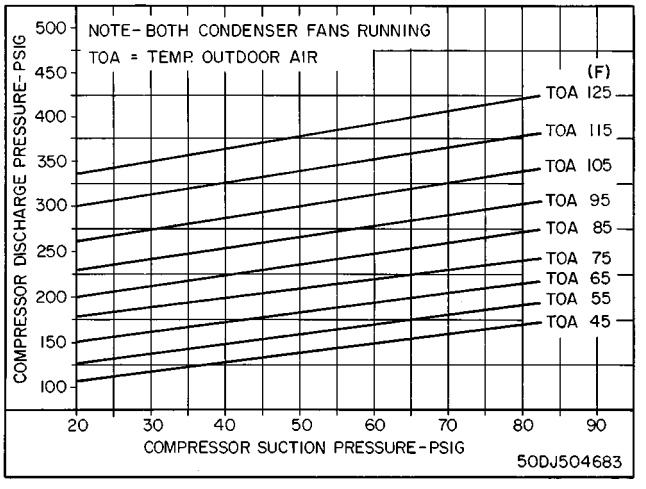


Fig. 43 — Charging Chart; 50DJ,DK,DW,DY024; System 2

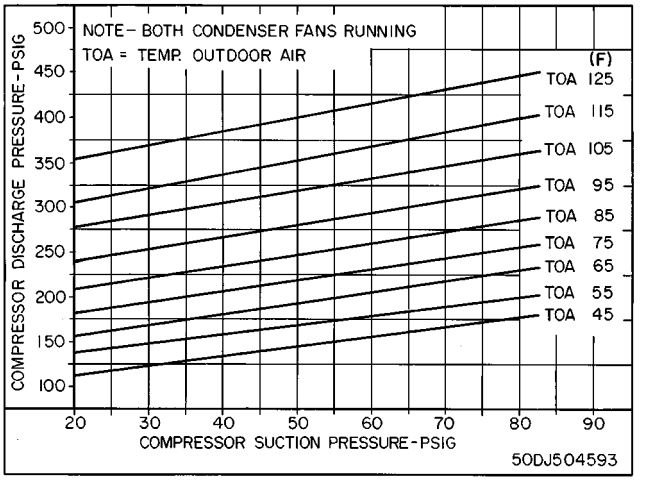


Fig. 46 — Charging Chart; 50DJ,DK,DW,DY030; System 1

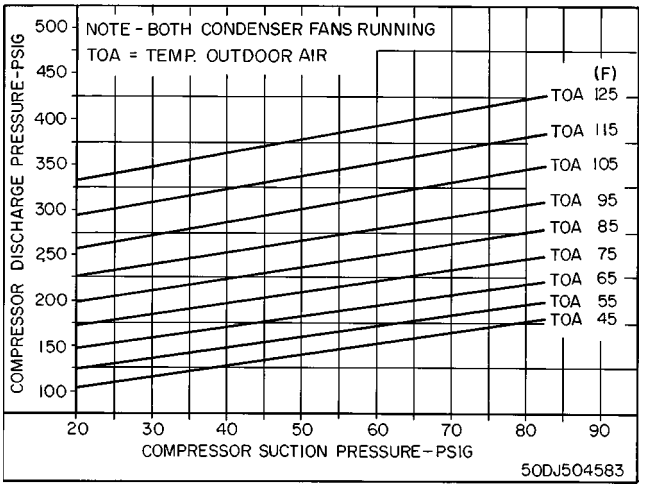


Fig. 44 — Charging Chart; 50DJ,DK,DW,DY028; System 1

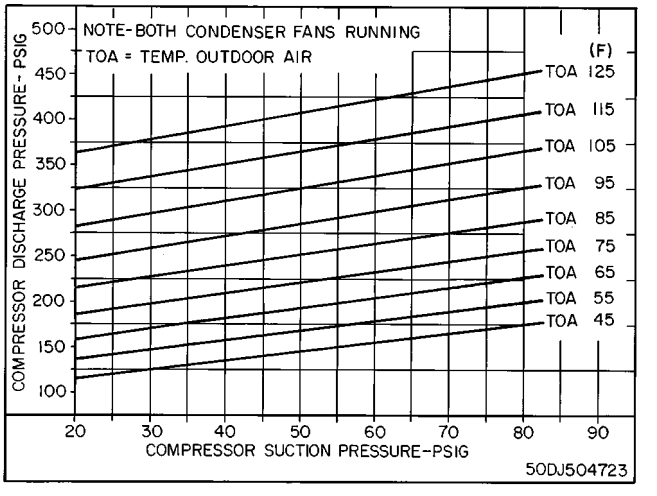


Fig. 47 — Charging Chart; 50DJ,DK,DW,DY030; System 2

Refrigerant Feed Components — Each refrigerant circuit (2 per unit) has all the necessary refrigerant controls:

Thermostatic Expansion Valve (TXV) — Each circuit has one. It is nonadjustable. Set to maintain 10 to 13 F superheat leaving the evaporator coil. Controls flow of liquid refrigerant to the evaporator coils.

Moisture/Liquid Indicator — A clear flow of liquid refrigerant indicates sufficient charge in the system. Bubbles indicate undercharged system or the presence of noncondensables. Moisture in the system measured in parts per million (ppm) changes the color of the indicator:

Green — moisture below 45 ppm
Chartreuse — 45 to 130 ppm (caution!)
Yellow — moisture above 130 ppm (wet)

Change filter driers at the first sign of moisture in the system.

IMPORTANT: Unit must be in operation at least 12 hours before moisture indicator can given an accurate reading. With unit running, indicating element must be in contact with liquid refrigerant to give a true reading.

Filter Drier — Replace whenever the moisture/liquid indicator shows moisture in the system.

Liquid Line Service Valve — Located immediately ahead of the filter drier, this valve has a ¼-in. flare connection for field charging. In combination with the compressor discharge service valve, each circuit can be pumped down into the high side.

Compressor Discharge Service Valve — Each compressor has one.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has one manual reset, calibrated trip, magnetic circuit breaker. Do not bypass connections or increase the size of the circuit breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Overtemperature — Each 06D compressor has an internal thermostat to protect it against excessively high discharge gas temperatures.

Crankcase Heater — Each compressor has a 75-watt crankcase heater to prevent absorption of liquid refrigerant by oil in the crankcase when the compressor is idle. Since 115-v power for the crankcase heaters is drawn from the unit control circuit, main unit power must be on for the heaters to be energized.

IMPORTANT: After a prolonged shutdown or service job, energize the crankcase heaters for 24 hours before starting the compressors.

Compressor Lockout — If any of the safeties (high-, low-pressure, compressor internal thermostat) trip, or if there is loss of power to the compressors, the constant volume control board will lock the compressors off. To reset, manually move the thermostat setting.

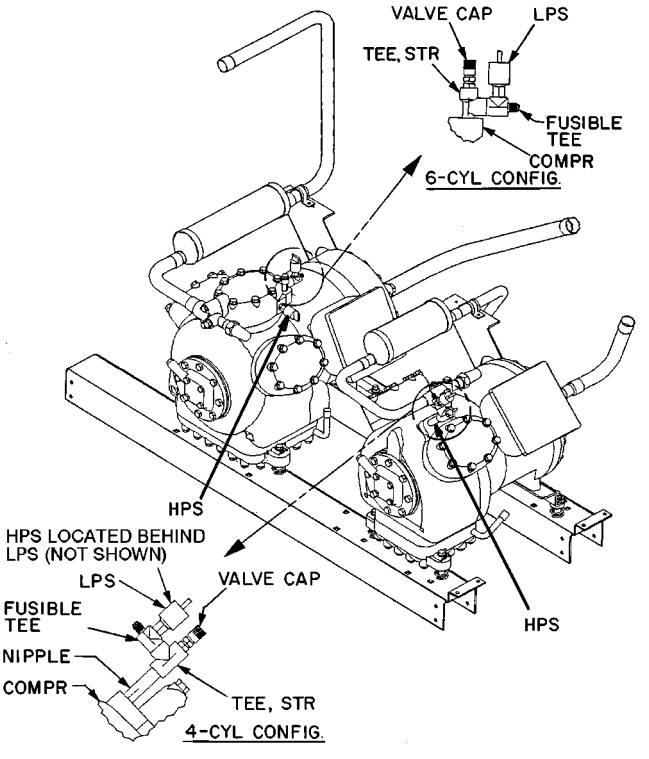
EVAPORATOR-FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

CONDENSER-FAN MOTOR PROTECTION — Each condenser-fan motor is internally protected against overtemperature. They are also protected against a severe overcurrent condition by manual reset, calibrated trip magnetic circuit breakers. As with the circuit breakers described previously, do not bypass connections or increase breaker size to correct trouble. Determine the cause and correct it before resetting the breaker.

HIGH- AND LOW-PRESSURE SWITCHES — Seek Fig. 48 for compressor mounting locations. Settings for these switches are shown in Table 21. If either switch trips or if the compressor overtemperature switch activates that refrigerant circuit will be automatically locked out by the constant volume control board. To reset, manually move the thermostat setting.

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side.

Control Circuit, 115 V — This control circuit is protected against overcurrent by a 5-amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting.



LEGEND

COMPR — Compressor
CONFIG — Configuration
CYL — Cylinder
HPS — High-Pressure Switch
LPS — Low-Pressure Switch
STR — Street

Fig. 48 — Compressor Components

Table 21 — Pressure Switch Settings (psig)

SWITCH	CUTOUT	CUT-IN
High	426 ± 7	320 ± 20
Low	27 ± 4	67 ± 7

Control Circuit, 24 V — This control circuit is protected against overcurrent by a 3.2-amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting.

Electric Heat

OVERCURRENT — Heaters are protected by fuses in the power circuit, located in the heater control box. As with circuit breakers, determine the cause of fuses tripping before replacing them. Do not replace with larger fuses. All fuses are 60 amps except for the 18 kW, 460-v heater, which uses 35-amp fuses.

OVERTEMPERATURE — Heaters are protected by limit switches mounted in the heater box. They reset automatically once they cool.

TROUBLESHOOTING, CV UNITS

Economizer — The economizer control consists of an electronic control board mounted on the back of the cover plate of the economizer motor with the adjustments and electrical plugs accessible through the top of the cover. The economizer control is factory wired to the terminals on the motor. All potentiometers and adjustments are a part of the control board. See Fig. 49 for economizer wiring details.

MOTOR CHECKOUT — The motor may be checked out separately from the control board. See Table 22 for motor checkout. To check out the motor, apply 24 vac power to terminals T0 and T2 of the control board.

NOTE: The connections to motor terminals T1 and R must remain in place.

Table 22 — Economizer Motor Checkout

MOTOR TEST	PROCEDURE	EXPECTED RESULT AND RESPONSE
A	Remove wire connected to terminal W on the motor.	Motor drives open. If not, replace the motor.
B	Remove wire connected to terminal B on the motor, leaving W wire disconnected (Test A).	Motor drives closed. If not, replace the motor.

CONTROL BOARD CHECKOUT — To check out the control board motor, conduct the following 4 tests.

Test 1:

1. Apply 24 vac power to terminals T0 and T2 of control board.
2. Remove mixed air sensor connected between terminals S1 and S2.
3. Remove outdoor-air enthalpy sensor between terminals ++ and SO.
4. Refer to Table 23.

Table 23 — Economizer Control Board Checkout, Test 1

MOTOR TEST	PROCEDURE	EXPECTED RESULT AND RESPONSE
A	Turn minimum position potentiometer fully counterclockwise.	Motor drives closed. If not, check minimum position jumper between terminals Z and Y, and check terminal W and T1 connections to motor.
B	Turn minimum position potentiometer fully clockwise.	Motor drives open. If not, check terminal B and R connections to the motor.

Test 2:

1. Apply 24 vac power to terminals T0 and T2 of the control board.
2. Apply 24 v between terminals 1 and T2, and jumper terminal T0 to terminal 1.
3. Remove the mixed-air sensor connected between terminals S1 and S2, and replace it with a 5490-ohm resistor.
4. Remove outdoor-air enthalpy sensor between terminals ++ and SO, and replace it with a 1.2 Kohm resistor.
5. Turn the minimum position potentiometer fully counterclockwise.
6. Refer to Table 24.

Table 24 — Economizer Control Board Checkout, Test 2

MOTOR TEST	PROCEDURE	EXPECTED RESULT AND RESPONSE
A	Turn enthalpy set point potentiometer to the A position.	1. The relays energize. If not, check return enthalpy resistor. If resistor is okay control board is faulty. 2. Motor drives open. If relays energize, but motor does not drive open, the control board is faulty.
B	Turn enthalpy set point potentiometer to the D position.	1. The relays deenergize. If not, control board is faulty. 2. Motor drives closed. If relays deenergize by motor does not drive closed, the control board is faulty.

Test 3:

1. Apply 24 VAC power to terminals T0 and T2 of the control board.
2. Apply 24 v between terminals 1 and T2, and jumper terminal T0 to terminal 1.
3. Remove the mixed-air sensor connected between terminals S1 and S2, and replace it with a 5490-ohm resistor.
4. Remove outdoor-air enthalpy sensor between terminals ++ and SO, and replace it with a 1.2 Kohm resistor.
5. Turn the minimum position potentiometer fully counterclockwise.
6. Turn enthalpy set point potentiometer to the A setting.
7. Refer to Table 25.

Table 25 — Economizer Control Board Checkout, Test 3

MOTOR TEST	PROCEDURE	EXPECTED RESULT AND RESPONSE
A	Turn mixed-air potentiometer to the midpoint position.	Motor should drive to mid-stroke with the set point set between 60 and 70 F. If not, the control board is faulty.
B	Turn mixed-air potentiometer fully counter-clockwise.	Motor drives open, If not, the control board is faulty.
C	Turn mixed-air potentiometer fully clockwise.	Motor drives closed. If not, the control board is faulty.

Test 4

Refer to Table 26 for the correct procedure for test 4.

Table 26 — Economizer Control Board Checkout, Test 4

MOTOR TEST	PROCEDURE	EXPECTED RESULT AND RESPONSE
A (Outdoor-Air Sensor)	1. Connect the enthalpy sensor terminal + to terminal + on the motor. 2. Connect the positive terminal of a DC milliammeter to terminal S of the sensor. 3. Connect the negative terminal of a DC milliammeter to terminal S_O of the enthalpy board.	Milliammeter reading should be between 3 and 24 mA if the sensor is operating correctly. If the reading is 0 mA, the sensor is either wired backward or is defective.
B (Indoor-Air Sensor)	1. Connect the enthalpy sensor terminal + to terminal + on the motor. 2. Connect the positive terminal of a DC milliammeter to terminal S of the sensor. 3. Connect the negative terminal of a DC milliammeter to terminal S_R of the enthalpy board.	Milliammeter reading should be between 3 and 24 mA if the sensor is operating correctly. If the reading is 0 mA, the sensor is either wired backward or is defective.

Control Board Checkout — The following tools are required to perform the troubleshooting tasks detailed in this section:

1.5-v battery

2 sets of jumper wires with alligator clips

Multimeter

Toggle switch with 14-in. wires terminated with ¼-in. spade connectors

⚠ DANGER

Read these instructions completely before attempting to troubleshoot the control board. Failure to follow the steps precisely could result in damage to unit, personal injury, or death.

The control board checkout procedure consists of 3 parts: A basic check to verify availability of 24 and 115 v to the control board; a detailed check of each circuit within the board; and a continuity check for the economizer board.

BASIC CHECK — Refer to Fig. 50 for control board component identification.

IMPORTANT: If unit is equipped with an economizer option, disconnect and remove the economizer control board.

NOTE: All plugs (except P1) are labeled for easy identification. Plug P1 can be identified by its orange color.

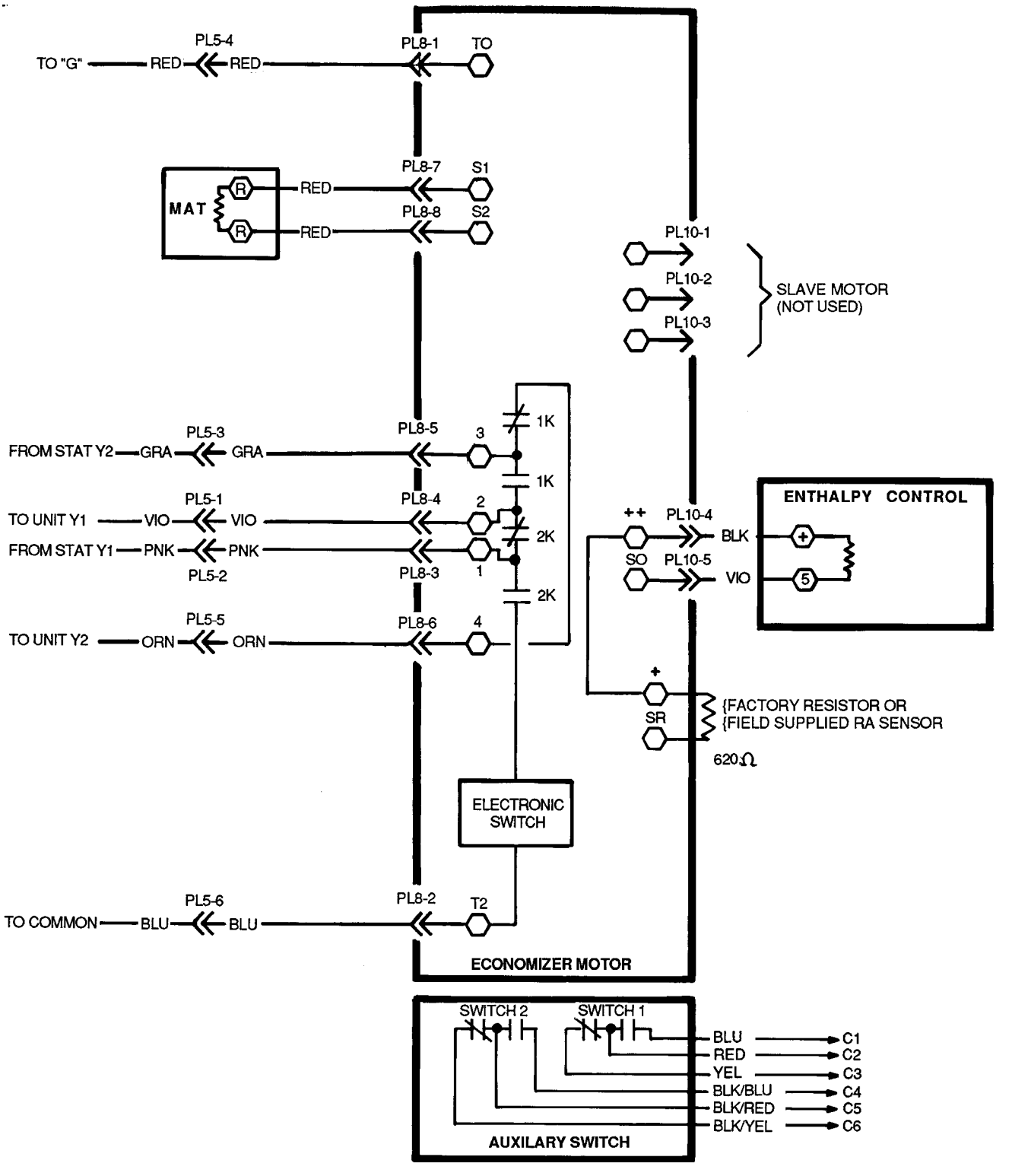
1. Turn unit power off. Disconnect plug P1 from control board.
2. Turn unit power on and check voltage across Pin R and Pin C at plug P1. If voltage reads 18 to 30 v, skip to Step 5.
3. Turn unit power off. Disconnect plug P3.
4. Turn unit power on and measure voltage across wires on plug P3, Pins 1 and 2 (wires coming from the unit). If voltage reads 18 to 30 v, there is either a bad connection between plug P3 and control board, or the control board is defective. Verify the connection at this point and proceed to Step 5. If there is no voltage, check the circuit breaker and transformer in the 24-v control circuit of the unit.
5. Turn unit power off and disconnect plug P4 from the control board.
6. Switch scale on meter to read 115 v.
7. Turn unit power on and check voltage across Pin 6 on plug P4 and unit ground (wires coming from the unit). If voltage reads 104 to 122 v, there is adequate power available to the board. Verify connection at this point and proceed to Step 8 below. If there is no voltage, check the circuit breaker and transformer in the 115-v control circuit of the unit.
8. After verifying that 24-v and 115-v supply power is available to the control board, turn unit power off and reconnect plugs P1, P3, and P4. Proceed to Detailed Check section below.

DETAILED CHECK

NOTE: Plug P1 must be disconnected in order to perform any of the troubleshooting steps detailed in this section. To save time, reconnect plug P1 only after you have completed all of the required troubleshooting.

Symptom: Evaporator fan will not operate.

1. Turn unit power off and disconnect plug P1 from the control board.
2. Install a jumper across Pin R and Pin G at plug P1 on the control board.
3. Turn unit power on and check if the indoor (evaporator) fan contactor (IFC) coil has been pulled in. If the IFC coil has not been pulled in, check the voltage across the IFC coil. If there is voltage at this point, the IFC contactor is defective. If there is no voltage, proceed to Step 4.



LEGEND

C — Contactor
MAT — Mixed-Air Thermistor
PL — Plug
RA — Return-Air
STAT — Thermostat

NOTES:
1. Relay contacts 1K and 2K are shown in high enthalpy position. Actuator is controlled by minimum position potentiometer.
2. When electronic switch is energized, MAT controls actuator operation.

Fig. 49 — Economizer Wiring Detail

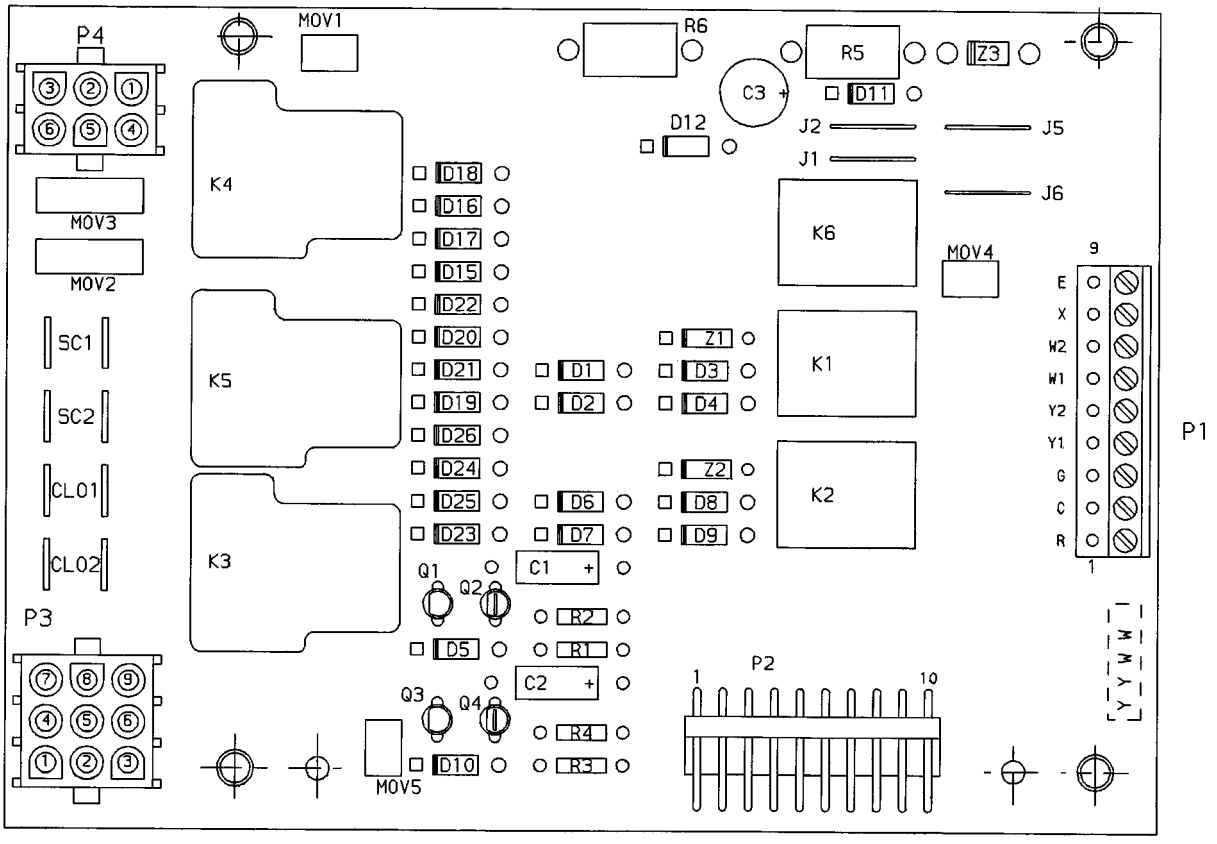


Fig. 50 — Control Board Component Arrangement

4. Turn unit power off and disconnect plug P4 from the control board.
5. Turn unit power on and check for continuity across Pin 6 and Pin 3 at plug P4 on the control board. If there is no continuity, the board is defective. Replace control board. If there is continuity, then there is a bad connection between the board and plug P4. Correct the connection.
6. Turn unit power off. Reconnect plug P1 (if troubleshooting is complete) and plug P4.

Symptom: Condenser fan no. 1 will not operate.

1. Turn unit power off. Disconnect plugs P1 and P3 from the control board.
2. Check for continuity between Pin 8 at plug P3 on the control board and Pin Y1 on the control board. If there is no continuity, the board is defective. If there is continuity, either the connection is bad between plug P3 and the control board or the problem is external to the board. Reconnect plug P1 (if troubleshooting is complete) and plug P3 to the board.

Symptom: Condenser fan no. 2 will not operate.

Check operation of condenser fan no. 1. If fan no. 1 operates properly, the problem is external to the board.

Symptom: Compressor no. 1 will not operate.

1. Turn unit power off. Disconnect the wires attached to the terminals marked SC1.
2. Check continuity between the 2 wires. If there is no continuity, the problem is external to the control board (possibly the pressure switches). If there is continuity, proceed to Step 3.
3. Reconnect the wires removed in Step 1 above.
4. With the unit power still off, disconnect plug P1 from control board. Install a jumper wire across Pin R and Pin Y1 at plug P1 on the control board.
5. Connect a voltmeter across the coil for compressor no. 1 contactor.
6. Energize unit and monitor the voltage for a few seconds.

IMPORTANT: Do not run compressor too long.

7. a. If proper voltage is indicated at the contactor, but contactor fails to close, replace contactor.
   b. If voltage is indicated for a few seconds (i.e., the contactor momentarily pulls in and is then de-energized), the compressor lockout (CLO) logic has shut down the unit. This is an indication that the board is not sensing proper compressor current, or that one of the safeties has tripped. Proceed to Step 8 to verify compressor lockout logic operation.
   c. If proper voltage is indicated at the contactor and contactor closes, the board is operating properly.
8. To verify compressor lockout logic:
   a. Disconnect CLO sensor wires connected to CLO1 at the control board. Check wires for continuity. If there is no continuity, replace the sensor.

b. Connect the multimeter to read voltage between Pin X at plug P1 and ground.

c. Turn unit power on and check the multimeter. Within a few seconds the meter should indicate 24 v. If it does not, the control board is defective and must be replaced.

d. Turn unit power off. Use a toggle switch to connect a fresh 1.5-v battery to the terminals marked CLO1 as shown in Fig. 51.

⚠ CAUTION

The negative (−Ve) pole of the battery must be connected to the inner terminal and the positive (+Ve) pole must be connected to the outer terminal as shown in Fig. 51.

e. Turn unit power on and use the toggle switch to make and break the connection between the outer CLO1 terminal and the positive (+Ve) pole of the battery.

f. If the multimeter shows 24 v when the battery is disconnected and no voltage when the battery is connected, the CLO logic is good. If the multimeter shows no change, the CLO logic is defective and the board must be replaced. Remove all jumpers and replace all plugs except plug P1. (Replace plug P1 only if no further testing is to be done.)

Symptom: Compressor no. 2 will not operate.

1. Be sure unit power is off. Disconnect the 2 wires attached to the terminals marked SC2.
2. Check continuity between the 2 wires. If there is no continuity, the problem is external to the control board (possibly the pressure switches). If there is continuity, proceed to Step 3.
3. Reconnect the wires removed in Step 1 above.
4. Turn unit power off. Disconnect plug P1 from the control board and install jumper wire across Pins R and Y2 at plug P1.
5. Connect a voltmeter across the coil for compressor no. 2 contactor.
6. Energize unit and monitor the voltage for a few seconds.

IMPORTANT: Do not run compressor too long.

7. a. If proper voltage is indicated at the contactor, but contactor fails to close, replace contactor.

   b. If voltage is indicated for a few seconds (i.e., the contactor momentarily pulls in and is then de-energized), the CLO logic has shut down the unit. This is an indication that the board is not sensing proper compressor current, or that one of the safeties has tripped. Proceed to Step 8 to verify compressor lockout logic operation.

   c. If proper voltage is indicated at the contactor and contactor closes, the board is operating properly.

8. To verify compressor lockout logic:

   a. Disconnect CLO sensor wires connected to CLO2 at the control board. Check wires for continuity. If there is no continuity, replace the sensor.

   b. Connect the multimeter to read voltage between Pin X on plug P1 and ground.

   c. Turn unit power on and check the multimeter. Within a few seconds the meter should indicate 24 v. If it does not, the control board is defective and must be replaced.

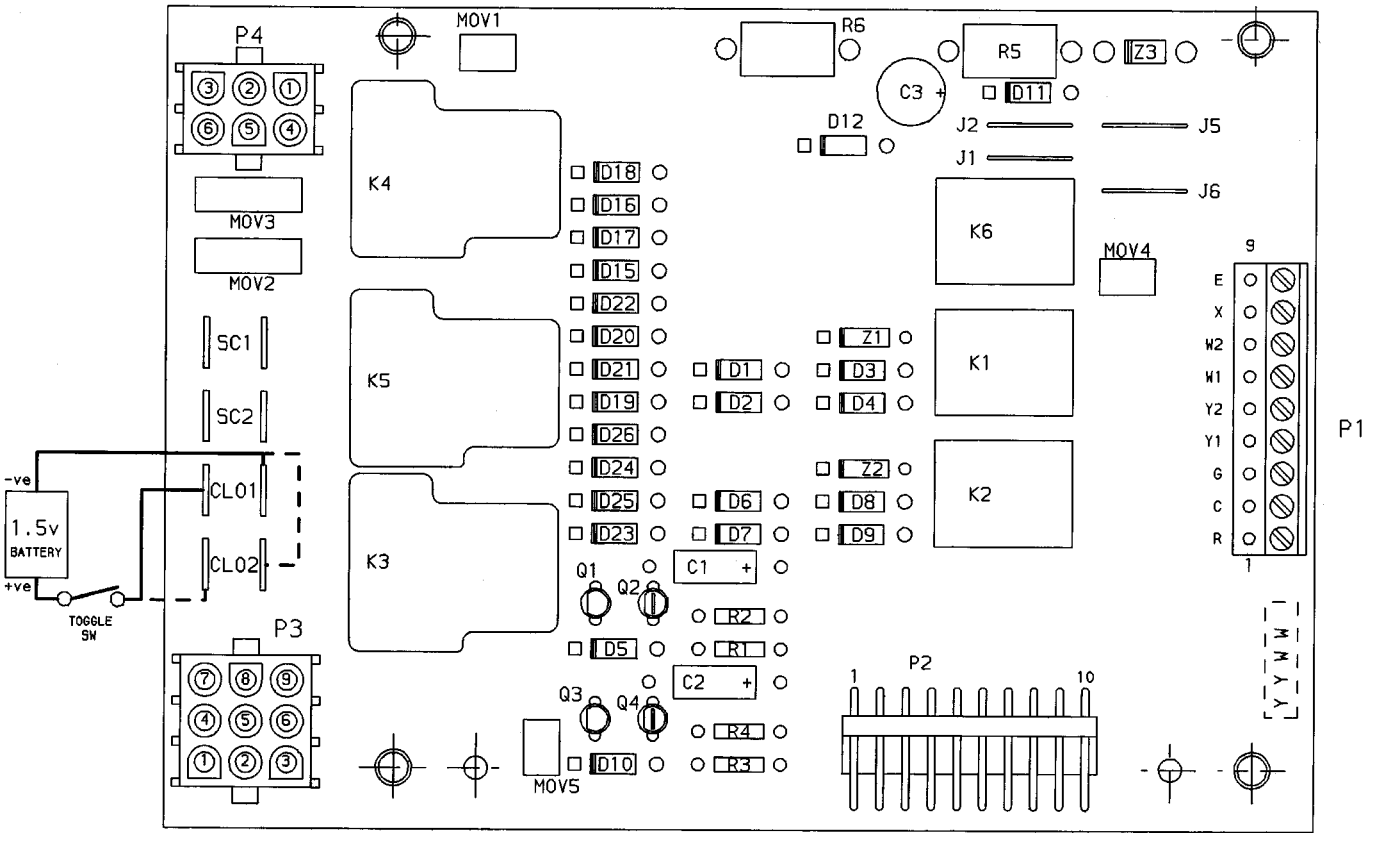


Fig. 51 — Compressor Lockout Connections

d. Turn unit power off. Connect a fresh 1.5-v battery to terminals marked CLO2 as shown in Fig. 51.

⚠ CAUTION

The negative (−Ve) pole of the battery must be connected to the inner terminal and the positive (+Ve) pole must be connected to the outer terminal as shown in Fig. 51.

e. Turn unit power on. Make and break the connection between the outer CLO2 terminal and the positive (+Ve) pole of the battery.

f. If the multimeter shows 24 v when the battery is disconnected and no voltage when the battery is connected, the CLO logic is good. If the multimeter shows no change, the CLO logic is defective and the board must be replaced. Remove all jumpers and replace all plugs except plug P1. (Replace plug P1 only if no further troubleshooting is required.)

Symptom: First or second stage of heating will not operate.

1. Turn unit power off. Disconnect plugs P1 and P3.
2. Check continuity between Pin W1 at plug P1 and Pin 5 at plug P3. If there is continuity, the board is good and the problem is either the connection at P3, or external to the control board. If there is no continuity, the control board is defective and must be replaced.
3. Check continuity between Pin W2 at plug P1 and Pin 7 at plug P3. If there is continuity, the board is good and the problem is either at the connection at plug P3 or external to the board. If there is no continuity, the board is defective and must be replaced. Reconnect plug P3 to the control board. (Reconnect plug P1 only if no further troubleshooting is required.)

Symptom: Evaporator fan will not energize on a call for heat.

1. Turn unit power off. Disconnect plug P1 and plug P4.
2. Install jumper wire between Pin R and Pin W1 at plug P1.
3. Turn unit power on. Check for continuity between Pin 6 and Pin 3 at plug P4 on control board.
4. If there is no continuity between these points, the board is defective and must be replaced.

NOTE: The control board has no time delay.

5. If there is continuity between these points, the problem is at the connection at plug P4 or external to the control board.
6. Turn unit power off. Reconnect plugs P1 and P4.

ECONOMIZER BOARD CONTINUITY CHECK — The economizer board is a connection board that is used to interface the economizer circuit with the base unit and thermostat. There are no electronic components or logic built into this board.

1. Disconnect plugs P1 and P5 at the economizer control board. Disconnect the harness going from the economizer board to the unit control board.
2. Check continuity between points shown below. (See Fig. 52 for identification of points on the board.)

   P1-1 to P4-1
   P1-2 to P4-2
   P1-2 to P5-5
   P1-3 to P4-3
   P1-4 to P5-2
   P4-4 to P5-3
   P1-5 to P5-1
   P4-5 to P5-4
   P1-6 to P4-6
   P1-7 to P4-7
   P1-8 to P4-8
   P1-9 to P4-9
   P4-10 to P5-6

3. If there is continuity between the above points, the economizer board is good. Reconnect plugs P1 and P5 to the economizer board and connect the economizer harness to the unit control board.

   If there is no continuity between the above point, the economizer board is defective. Replace board.

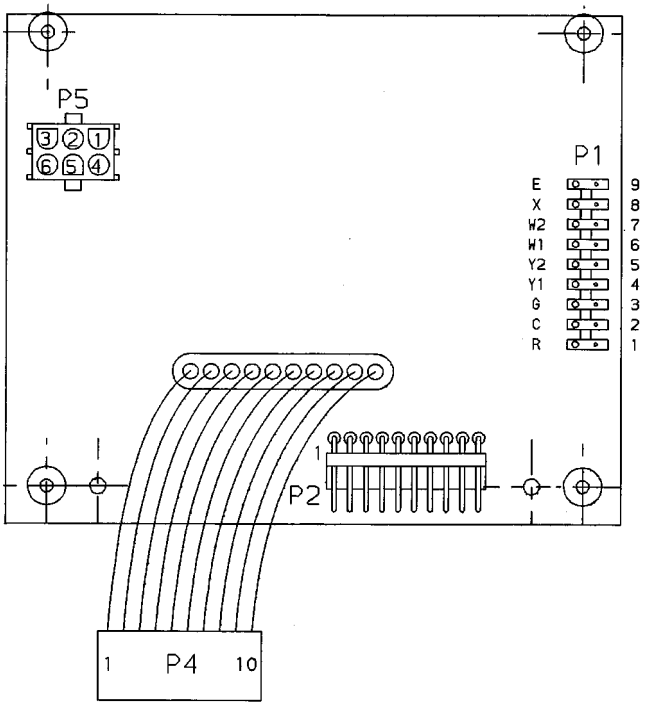


Fig. 52 — Economizer Board

TROUBLESHOOTING, VAV UNITS

VAV Diagnostic Information — The microprocessor contains extensive self-diagnostic information. The display board is used to display the diagnostic codes and the alarm light (located next to display board) is energized whenever a diagnostic code is tripped.

Table 27 details diagnostic codes and a brief description of the possible causes.

CODE 30: REAL TIME MEASUREMENT FAILURE — If communication links between internal components of the microprocessor are disrupted, unit will stop and microprocessor will energize alarm light and display a code of 30 when display button is pushed. The unit will be locked off; to reset, the ON-OFF switch must be turned to OFF then to ON position again.

If the failure is intermittent, probable cause is electrical interference, noise or incorrect wiring modifications. If the unit cannot be reset, the problem is most likely within the microprocessor and the board should be replaced.

CODE 51 TO 56: COMPRESSOR FAILURE — If compressor relay (CR) opens while compressor should be operating, compressor will stop and microprocessor will energize alarm light and display a code of 51 to 56 (depending on compressor) when display button is pushed. The compressor will be locked off; to reset, the ON-OFF switch must be turned to OFF and then to ON position again.

Code 51 is for Compressor 1, and Code 55 is for Compressor 2. Other codes are not used for 50DK,DY024-030 units.

The microprocessor has also been programmed to indicate a compressor failure if CR switch is closed when compressor is not supposed to be on.

If a failure occurs, the following are possible causes.

High-Pressure Switch Open — The high-pressure switch for each compressor is wired in series with 24-v power that energizes compressor relay. If high-pressure switch opens during operation, CR will stop compressor and this will be detected by microprocessor through the feedback contacts.

Internal Thermostat — The internal thermostat in each compressor is also wired in series with 24-v power that energizes CR. If switch opens during operation of compressor, compressor will shut down and failure detected through feedback contacts.

CR Failure — If CR fails with large relay either open or closed, microprocessor will detect this and lock compressor off and indicate an error.

Relay Board Failure — If small 24-v relay on the relay board fails, microprocessor will detect this through feedback contacts and indicate an error.

Processor Board Failure — If hardware that monitors feedback switch fails and processor board fails to energize the relay board relay to ON position, an error may be indicated.

The control does not detect compressor circuit breaker failures.

Table 27 — Overload Codes

DISPLAY	DESCRIPTION OF FAILURE	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
30	Real time measurement failure	Unit shut off	Manual	Electrical interference, noise, microprocessor failure.
51 **55**	Compressor 1 failure Compressor 2 failure	Circuit 1 shut off Circuit 2 shut off	Manual	High-pressure switch or high discharge gas thermostat switch trip, compressor ground current > 2.5 amp or compressor board relay on when it is not supposed to be on. Wiring error between electronic control and compressor protection module.
59 **60**	Loss-of-charge circuit 1 Loss-of-charge circuit 2	Circuit 1 shut off Circuit 2 shut off	Manual Manual	Not used on 50DK,DY024-030. Check jumper on processor board.
63 **64**	Low oil pressure circuit 1 Low oil pressure circuit 2	Circuit 1 shut off Circuit 2 shut off	Manual Manual	Not used on 50DK,DY024-030. Check jumper on processor board.
70	Illegal unit configuration	Unit will not start	Manual	Configuration error (see Note 1).
71 **72** **81**	Leaving-air thermistor failure Entering-air thermistor failure Reset temperature thermistor failure	Unit shut off Use default value Stop reset	Auto. Auto. Auto.	Thermistor failure, wiring error or thermistor not connected to the processor board.
82 **83** **84** **85** **86** **87**	Leaving-air set point potentiometer failure Economizer potentiometer failure Reset limit set point potentiometer failure Demand limit potentiometer failure Minimum economizer potentiometer failure Warm-up set point potentiometer failure	Use default value Close economizer Stop reset Stop demand limit Close economizer Use default value	Auto. Auto. Auto. Auto. Auto. Auto.	Potentiometer improperly connected, potentiometer setting out of range, potentiometer failure or wiring error.

NOTES:
1. Illegal unit configuration caused by missing programmable header or both unloader dip switches on.
2. All auto. reset failures that cause the unit to stop will restart when the error has been corrected.
3. All manual reset errors must be reset by turning the control switch off and then back on.
4. Valid resistance range for the thermistors is 363,000 to 219 ohms.

CODES 59 AND 60: LOW-PRESSURE SWITCH — These codes are used to indicate a low-pressure switch failure. Since the 50DK,DY024-030 units have low-pressure switches but are not monitored individually by the processor, these codes are not used for the 50DK,DY024-030 units. The terminals on the processor board must be jumpered together on the DK,DY units, or an error code will appear.

CODES 63 AND 64: OIL PRESSURE SWITCH — These codes are used to indicate an oil pressure switch failure. Since the 50DK,DY024-030 units do not have oil pressure switches, these codes are not used. The terminals on the processor board must be jumpered together or an error will occur.

CODE 70: ILLEGAL UNIT CONFIGURATION — If the unit configuration header is not installed and properly configured and/or if dip switches are not properly set, unit will not start and an error code of 70 will be indicated on display board when display button is pushed.

CODES 71 TO 81: THERMISTOR FAILURE — If measured temperature of a thermistor is less than −60 F (363,000 ohms) or greater than 180 F (585 ohms), the appropriate sensor error code (Table 27) will be displayed when the display button is pushed. Unit will be shut down. Thermistor failures will automatically reset once error has been corrected. If a failure occurs, the following are possible causes:

Thermistor Failure — A shorted or open thermistor will cause the failure.

Wiring Failure — If a wiring error exists that causes a shorted or open circuit, this will cause a failure.

Processor Board Failure — If circuitry on processor board fails, this could cause an error.

Code 71 is for leaving-air thermistor, while Code 72 is for entering-air thermistor. Code 81, for reset, is used only on units equipped with accessory reset. If accessory reset is used, put dip switch 2 on the processor board in the ON position. Other codes are not used for Models 50DK,DY024-030.

CODE 82: LEAVING-AIR TEMPERATURE SET POINT FAILURE — If leaving-air set point potentiometer (PI — located on display board) fails, control will use a default value of 70 F. A failure will cause an error code of 82 to be displayed on display board when display button is pushed; alarm light will also be energized. A failure is determined by establishing a range of −22 F to 70 F as a valid range. Anything outside this range will be treated as a failure. If setting is outside the −22 F to 70 F range, alarm light will be energized and an error code of 82 displayed when display button is pushed; the control will use a set point of 70 F. If set point is between −22 F and 45 F, control will use a set point of 45 F and no error code will be indicated. If potentiometer returns to normal, control will automatically reset.

NOTE: The full range of the potentiometer is not used for the cooling set point range of 45 F to 70 F. The full scale resistance of the potentiometer is 10 Kohms.

If a failure occurs, one of the following is a probable cause:

Incorrect Potentiometer Setting — A potentiometer turned fully clockwise or counterclockwise will cause a failure.

Faulty Wiring — If wiring is incorrect between processor board and display board, a failure will result.

Potentiometer Failure — If potentiometer is shorted or open, a failure will result.

CODE 83: ECONOMIZER FEEDBACK POTENTIOMETER FAILURE — If potentiometer on economizer motor fails, control will use a default value of 0% and economizer outdoor-air dampers will close. The failure will energize alarm light and cause an error code of 83 to be displayed when display button is pushed. If potentiometer returns to normal, control will automatically reset. If a failure occurs, one of the following is the probable cause.

Faulty Wiring — If the wiring between processor board and potentiometer is wrong, this will cause a failure.

Potentiometer Failure — If potentiometer is shorted or open, this will cause a failure.

Economizer Damper Stuck — The control has been programmed to indicate an error if potentiometer travel is less than 10% of the full range. This would happen if dampers or damper linkage were hung up and could not move properly.

CODE 84: RESET LIMIT POTENTIOMETER FAILURE — This code is applicable only if reset is being used. If reset is being used, dip switch 2 must be in the ON position. This potentiometer, P3, is located on the accessory board. If potentiometer setting is less than 0° F or greater than 80 F, alarm light will be energized, a diagnostic code of 84 will be displayed if display button is pushed, and will be terminated. The full-scale resistance of potentiometer is 10 Kohms, but when installed on the accessory board in parallel with other 2 potentiometers, measured resistance will be only 3.3 Kohms. This failure will automatically reset once potentiometer returns to normal. If a failure occurs, one of the following is the probable cause:

Dip Switch Problem — Dip switch 2 is in the ON position and the accessory board is not installed (accessory board is standard on these units so it should always be on the unit).

Incorrect Potentiometer Setting — A potentiometer turned fully clockwise or counterclockwise will result in a failure.

Faulty Wiring — If faulty wiring exists, this will cause the potentiometer to be out of range resulting in a failure.

Potentiometer Failure — If potentiometer is shorted or open, a failure will occur.

CODE 85: DEMAND LIMIT POTENTIOMETER FAILURE — Used only if demand limit is being used. If demand limit is used, dip switch 5 must be in the ON position.

Two types of demand limit are available: a field-supplied and installed single-step control consisting of a 10 Kohm, 3-wire linear potentiometer and an accessory 2-step control (accessory no. 32GB400274) available from Carrier. The single-step control has a single potentiometer while 2-step control has 2 potentiometers (mounted on the demand limit board, see Fig. 25).

For both, the control uses only 80% of the total potentiometer resistance. If resistance of potentiometer is less than 10% or greater than 90%, alarm light will be energized, a diagnostic code of 85 will be displayed when the display button is pushed, and demand limit will be terminated. If a failure occurs, it is probably due to one of the following:

Potentiometer Failure — If a potentiometer is shorted or open, a failure will occur.

Incorrect Potentiometer Setting — A potentiometer turned fully clockwise or counterclockwise will put potentiometer out of range resulting in an error.

Faulty Wiring — If faulty wiring exists that causes potentiometer to be out of range, an error will occur.

Dip Switch 5 — If dip switch 5 is in the ON position and potentiometer is not installed, an error will occur.

CODE 86: MINIMUM POSITION ECONOMIZER POTENTIOMETER FAILURE — If potentiometer P5 (on accessory board) setting is less than 0% or greater than 100%, alarm light will be energized, a code of 86 will be displayed when display button is pushed and economizer outside air dampers will go fully closed.

The potentiometer full-scale resistance is 10 Kohms, but when installed in parallel with other 2 potentiometers on the accessory board, measured resistance will only be 3.3 Kohms.

This failure will automatically reset when potentiometer returns to normal.

If a failure occurs, one of the following is the probable cause:

Accessory Board Not Installed — Should not be a problem since accessory board is standard on these units.

Incorrect Potentiometer Setting — If potentiometer is turned fully clockwise or counterclockwise, potentiometer will be out of the allowable range, and an error will result.

Faulty Wiring — If faulty wiring exists, potentiometer will be out of range, and an error will result.

Potentiometer Failure — If potentiometer is shorted or open, potentiometer will be out of range and an error will result.

CODE 87: WARM-UP TEMPERATURE SET POINT FAILURE — Applicable only if morning warm-up is used (50DK,DY units with optional electric heat). Even if the unit is not equipped with electric resistance heaters, use of the morning warm-up function is recommended if the unit is shut down at night or over weekends. In this application, cooling will remain off and the outdoor-air damper will stay closed until heat load from the occupied space elevates return-air temperature to the warm-up set point. If warm-up function is used, dip switch 4 must be in the ON position. The potentiometer, P6, is located on the accessory board. If potentiometer is set at less than 0° F or more than 95 F, alarm light will be energized, a diagnostic code of 87 will appear on the display when display button is pushed and control will use a default value of 40 F. If setting is between 0° F and 40 F, control will use a value of 40 F but no diagnostic code will be displayed; if setting is between 80 F and 95 F, control will use a value of 80 F but no diagnostic code will be displayed.

The potentiometer full-scale resistance is 10 Kohms, but when wired in parallel with other potentiometers on the accessory board, measured resistance is only 3.3 Kohms.

The failure will automatically reset once potentiometer returns to normal. If a failure occurs, one of the following is the probable cause.

Accessory Board Not Installed — Should not happen since the accessory board is standard on these units.

Incorrect Potentiometer Setting — If potentiometer is turned fully clockwise or counterclockwise, potentiometer will be out of the allowable range, resulting in an error.

Faulty Wiring — If faulty wiring exists, potentiometer will be out of range, resulting in an error.

Potentiometer Failure — If potentiometer is shorted or open, potentiometer will be out of range, resulting in an error.

Electronic Controls Checkout — The following will help determine whether a processor board, a relay board, display set point board or 2-step demand limit module is faulty.

Before checking out any board, the following steps should be taken:

1. At initial start-up, enter the quick test mode. This test will determine if all components are connected and operating properly.
2. If system has been operating and a malfunction occurs, check display for diagnostic codes. Use diagnostic chart located on inner panel of access door to control box section of unit; this chart will help determine probable cause of failure.

   These 2 steps will help determine if a component other than a board is at fault or if the problem is external to control circuit.

A volt-ohmmeter will be needed to troubleshoot boards. A digital meter is preferred but a Simpson 260 or equivalent will work.

⚠ CAUTION

To prevent damage to solid-state electronic components on boards, meter probes should only be placed on terminals and test points listed in following sections.

PROCESSOR BOARD CHECKOUT — Refer to Fig. 53 and 54 for location of terminal pins and test points.

Step 1 — Check transformer input to the board.

1. Turn control switch to ON position.
2. Check voltage at following terminals on pin terminal strip J4:

TERMINALS	VOLTAGE (AC)
1 to 2	15.3 to 20.9
4 to 6	16.2 to 22.0
5 to 6	8.1 to 11.0
5 to 4	8.1 to 11.0

3. If voltage is not within range, check primary side.

   115-v transformer — 104 to 127 vac
   230-v transformer — 207 to 254 vac
4. If primary voltage is not correct, check system fuse, ON-OFF switch and wiring. If these are okay, contact power company.
5. If primary voltage is correct, but secondary voltage is incorrect, replace transformer.

Step 2 — Check processor board power supply.

1. Set meter to dc voltage. Scale greater than 15 vdc.
2. Turn power switch to OFF position.
3. Connect negative lead to TP20.

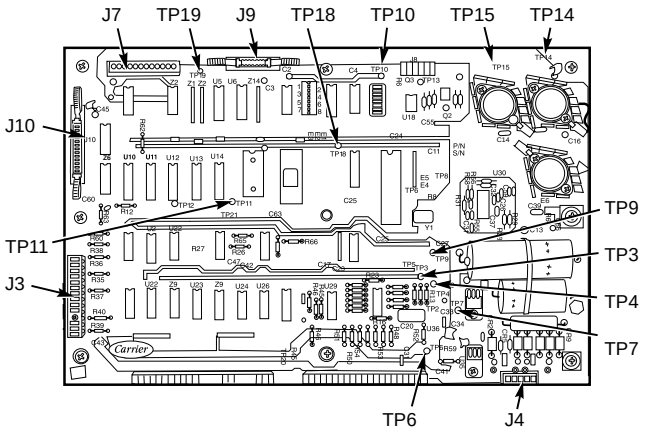


Fig. 53 — Processor Board Test Points

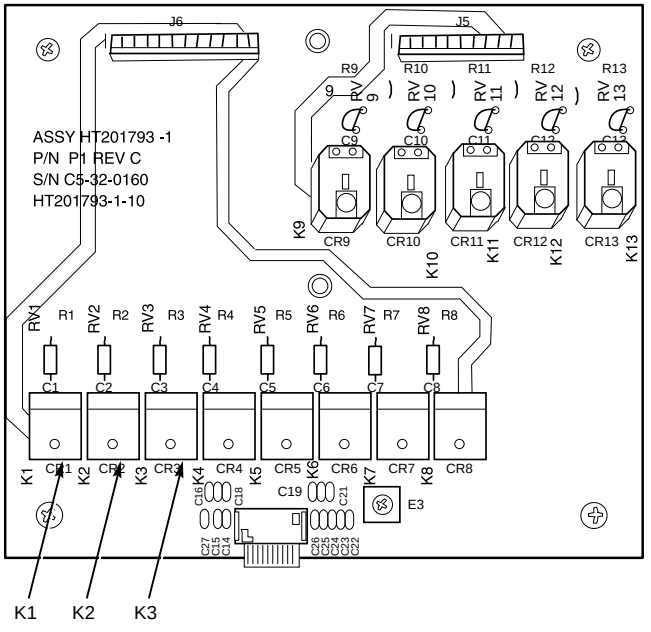


Fig. 54 — Relay Board Test Points

4. Turn power switch to ON position and press display button to enter quick test mode.
5. Check voltage between TP20 and each of the following test pines:

TEST PIN	VOLTAGE (DC)
TP3	+10
TP4	+12
TP6	+5
TP10	+5
TP14	+12
TP15	+12
TP7	−5*

*If not using a digital meter, leads must be reversed.

6. If voltage is incorrect, replace processor board.

Step 3 — Check voltage tolerance circuitry.

1. Negative test probe still on TP20 and system in quick test mode.
2. Check voltage TP20-TP9.
3. If voltage is greater than +3 vdc, recheck transformer input voltage.
4. If transformer is okay, replace processor board.

Step 4 — Check processor reset line.

1. Negative probe still on TP20.
2. Check voltage TP20-TP11.
3. If voltage is greater than +3 vdc, reset power and recheck.
4. If voltage is still incorrect, replace processor board.

Step 5 — Check relay board outputs from the processor board.

1. Turn power to OFF position.
2. Connect negative test probe to TP19 (meter still set to dc).
3. Turn switch to ON position and enter quick test mode.
4. Check voltage from TP19 to terminal 14 on pin terminal strip J9.
5. If not +12 vdc, replace processor board.
6. Turn switch to OFF position.
7. Remove negative test probe from TP19. Connect positive test probe to TP15.
8. Turn switch to ON position and go into quick test mode.
9. Check voltage between TP15 and terminals shown in Table 28 on pin terminal strip J9.

Table 28 — Voltage Reading

QUICK TEST STEP NO.	J9 PIN NUMBERS												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1.-2.3.	0	0	0	0	0	0	0	0	0	0	0	0	12
2.4.	0	0	0	0	0	0	12	0	0	0	0	0	12
2.5.	0	0	0	0	0	0	0	12	0	0	0	0	12
2.6.	0	0	0	0	0	0	0	0	0	12	0	0	12
2.7.	0	0	0	0	0	0	0	0	0	0	12	0	12
2.8.	0	0	0	0	0	0	0	0	0	0	0	12	12
2.9.	12	0	0	0	0	0	0	0	0	0	0	0	12
3.0.	0	12	0	0	0	0	0	0	0	0	0	0	12
3.1.	0	0	12	0	0	0	0	0	0	0	0	0	12
3.2.	0	0	0	0	12	0	0	0	0	0	0	0	12
3.3.	0	0	0	0	0	12	0	0	0	0	0	0	12

NOTES:
1. If any of the above voltages are not measured, replace the processor board.
2. Pins 1 through 8 will only be energized for 10 seconds.

Step 6 — Display board connection checkout.

1. Turn switch to OFF position.
2. Connect negative lead of meter to TP20.
3. Turn switch to ON position and go into quick test mode.
4. Check voltage at following pin terminals on pin terminal strip J10:

PIN TERMINAL	VOLTAGE (DC)
17	5
18	5
20	2.5
24	5

5. If voltage is not correct, replace processor board.

Step 7 — Potentiometer connection checkout.

1. Turn switch to OFF position.
2. Remove plug connection from pin terminal strip J3.
3. Connect negative meter lead to terminal 2 of J3.
4. Turn switch to ON position and go into quick test mode.
5. Check voltage at following pin terminals on terminal strip J3:

PIN TERMINAL	VOLTAGE (DC)
1	2.5
3	5
6	5
10	2.5
12	5
13	2.5

6. If voltage is not correct, replace processor board.

RELAY BOARD CHECKOUT

Step 1 — Low-voltage relay resistance check.

1. Turn switch to OFF position.
2. Remove plug connection from terminal strip J6.
3. Set meter to measure resistance. Connect negative test lead to both terminals 11 and 12 of J6.
4. Turn switch to ON position and go into quick test mode.
5. Place other meter lead on terminals shown in Table 29 and check resistances at each quick test step.

Table 29 — Resistance Reading

QUICK TEST STEP NO.	J6 PIN NUMBERS							
	1	2	3	4	5	6	7	8
1.-2.8.	∞	∞	∞	∞	∞	∞	∞	∞
2.9.	0	∞	∞	∞	∞	∞	∞	∞
3.0.	∞	0	∞	∞	∞	∞	∞	∞
3.1.	∞	∞	0	∞	∞	∞	∞	∞
3.2.	∞	∞	∞	∞	0	∞	∞	∞
3.3.	∞	∞	∞	∞	∞	0	∞	∞

NOTE: Resistance will stay at zero ohms for only 10 seconds.

6. If these resistances are not correct and relay board outputs from processor board have been checked out, replace relay board.

Step 2 — High-voltage relay resistance check.

1. Turn switch to OFF position.
2. Remove plug connection from terminal strip J5.
3. Connect negative test lead to either terminal 8, 9 or 10.
4. Turn switch to ON position and go into quick test mode.
5. Place other meter lead on terminals shown in Table 30 and check resistance at each quick test step.

Table 30 — Resistance Reading

QUICK TEST STEP NO.	J5 PIN NUMBERS				
	1	2	3	4	5
1.-2.3.	∞	∞	∞	∞	0
2.4.	∞	∞	∞	∞	0
2.5.	∞	∞	∞	∞	0
2.6.	∞	0	∞	∞	0
2.7.	∞	∞	0	∞	0
2.8.	∞	∞	∞	0	0
2.9.	∞	∞	∞	∞	0
3.0.	∞	∞	∞	∞	0
3.1.	∞	∞	∞	∞	0
3.2.	∞	∞	∞	∞	0
3.3.	∞	∞	∞	∞	0

6. If these resistances are not correct and relay board outputs from processor board have been checked per Processor Board Checkout section on page 60, replace relay board.

DISPLAY BOARD CHECKOUT

Step 1 — Check the output voltage from processor board to the relay board — Refer to Processor Board Checkout, Display Board Connection Checkout section on page 61.

Step 2 — Check the display LEDs.

1. Enter quick test mode.
2. If 88 is not displayed, replace display board.

Step 3 — Check set point potentiometer — Advance the display to quick test step 1.9 to determine if this potentiometer is set and connected properly.

Step 4 — Check display switch — — Press switch. If switch does not click, it is faulty and the display will be energized continuously. Switch is an integral part of display board and cannot be replaced separately.

TWO-STEP DEMAND LIMIT MODULE — Disconnect board from the processor board by disconnecting connector from J2 on the processor board. Use resistance meter to check resistance at following different operating conditions.

1. Condition IC2 and IC3 not energized.
   Terminal 3 to 1 — 1.3 Kohms
   Terminal 3 to 2 — 12.6 Kohms
2. Condition IC2 energized, IC3 off.
   Terminal 3 to 1 — 1.3 to 6.3 Kohms (depends on P1 setting)
   Terminal 3 to 2 — 12.6 Kohms
3. Condition IC3 energized, IC2 on or off.
   Terminal 3 to 1 — 6.3 to 11.3 Kohms
   Terminal 3 to 2 — 12.6 Kohms

If board is found to be defective (i.e., above resistance not measured), it must be replaced.

PACKAGED SERVICE TRAINING

Our packaged service training programs provide an excellent way to increase your knowledge of the equipment discussed in this manual. Product programs cover:

- Unit Familiarization
- Installation Overview
- Maintenance
- Operating Sequence

A large selection of product, theory, and skills programs is available. All programs include a video cassette and/or slides and a companion booklet. Use these for self teaching or to conduct full training sessions.

For a free Service Training Material Catalog (STM), call 1-800-962-9212. Ordering instructions are included.

START-UP CHECKLIST

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

PRE-START-UP

☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT

☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS

☐ VERIFY THAT CONDENSATE CONNECTIONS AND SEAL PLATES ARE INSTALLED

☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS

☐ CHECK THAT INDOOR AIR FILTERS ARE CLEAN AND IN PLACE

☐ VERIFY THAT UNIT IS INSTALLED LEVELLY

☐ CHECK CONDENSER FAN PROPELLERS FOR LOCATION IN ORIFICE AND TIGHTEN SET SCREWS

☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED

☐ OPEN DISCHARGE AND LIQUID LINE SERVICE VALVES

☐ CHECK OUTDOOR-AIR HOODS FOR PROPER INSTALLATION

☐ VERIFY FANS ARE ROTATING IN THE CORRECT DIRECTION

☐ VERIFY INSTALLATION OF BUILDING PRESSURE CONTROL TUBES

☐ PERFORM QUICK TEST OF CONTROLS TO VERIFY OPERATION (VAV UNITS)

START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

SUPPLY FAN AMPS _____ RETURN/EXHAUST FAN AMPS — MTR NO. 1 _____ MTR NO. 2 _____

COMPRESSOR AMPS — COMPRESSOR NO. 1 L1 _____ L2 _____ L3 _____

— COMPRESSOR NO. 2 L1 _____ L2 _____ L3 _____

TEMPERATURES

OUTDOOR AIR TEMPERATURE _____ DB (Dry-Bulb)

RETURN AIR TEMPERATURE _____ DB _____ WB (Wet-Bulb)

COOLING SUPPLY AIR _____ F

ELECTRIC HEAT SUPPLY AIR _____ F

PRESSURES

REFRIGERANT SUCTION CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGE 50.

CUT ALONG DOTTED LINE

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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Tab 1b